Report from Brussels ■ Embedded microprocessors

A CAHNERS PUBLICATION
SIX DOLLARS

Electronic Business®

OR MANAGEMENT IN ELECTRONICS, COMPUTER, AND SYSTEMS COMPANIES — WORLDWIDE

MARCH 18, 1991

THE CEO AGENDA

Second Annual Exclusive Survey of Chief Executives by Electronic Business and Ernst & Young

Worldwide, business has never been tougher. Top priorities for U.S. electronics executives:

- ✓ Devise winning strategies
- ✓ Search for new opportunities
- ✓ Empower the workforce
- ✓ Compete on a global scale
- ✓ Acquire key technologies
- ✓ Redefine the organization

See Page 33

Electronic Business

FOR MANAGEMENT IN ELECTRONICS, COMPUTER, AND SYSTEMS COMPANIES—WORLDWIDE

VOL. 17, NO. 6 MARCH 18, 1991

THE CEO AGENDA

Second Annual Exclusive Survey of Chief Executives by Electronic Business and Ernst & Young

PAGE 34 According to the 1991 CEO survey, top electronics executives take a dim view of their industry's future

COVER STORY/CEO SURVEY

34 Writing an agenda for the 1990s

In the second annual ELECTRONIC BUSINESS CEO survey—a joint project with the consulting firm of Ernst & Young—we zero in on the problems facing top electronics executives in today's shaky world marketplace. Stiffening competition, rapid technological change, and organizational tactics are just some of the topics discussed by nearly 600 top executives. In-depth interviews and survey results provide insight into the future of the electronics industry

UPDATE

9 Gulf Update
Posted in the very eye of Desert Storm, civilian defense contractors face many of the same threats as military personnel, often with less protection

15 Business Trends
Electronics industry gets some good news from the federal budget; worldwide electronics market to hit $1 trillion; Microsoft optimistic about Windows and OS/2; computer sales take another tumble; mail order sets the pace in home-office sales; videoconferencing provides alternative to air travel; company goes Hawaiian to boost worker morale

25 Companies to watch
Telecommunications software maker Unifi Communications, PLD designer Minc Inc., neurocomputing chip developer Adaptive Solutions

29 Commentary
Is hardware outpacing the software market and is one driven by the other? Will Fastie offers his view

COVER STORY/CEO SURVEY

34 Writing an agenda for the 1990s
There is one message that comes out of our second annual CEO survey: The market has been redefined by slower growth and maturing products. And while superior technology alone all but guaranteed success a few years ago, today it's simply the price of playing the game. The survey examines these and other challenges and studies how top executives are responding to them

44 A blueprint for competitiveness
While innovation, product quality, and customer satisfaction are recognized as essential to the competitive company of the 1990s, CEOs concede they still lag their foreign rivals in the battle for global market share. Some companies claim to be fighting back by paying more attention to the customer at every stage of the design process

COVER STORY/CEO SURVEY

52 The rising price of technological leadership
According to the survey, technological innovation is the most critical issue for maintaining competitiveness. Still, half of the CEOs agree that the United States is rapidly losing its technological edge, and almost as many see the picture getting even worse by 1995. The reason: Shrinking R&D spending could end the era of technological breakthroughs

60 The changing face of the organization
There is no single answer to guarantee an exceptional organization. But many believe that customer satisfaction and a total commitment to quality are the starting points in creating a first-rate company. Just as important are well-educated, highly motivated employees who aren't afraid to challenge the status quo

PAGE 89 "The lack of a home market is a massive disadvantage," says Terry Kelly, managing director of KEL Aerospace

PAGE 25 Unifi software will help companies manage voice, data, and image traffic, according to CEO Robert Pokress

PAGE 9 Tech reps in the Gulf wielded screwdrivers, wrenches, and even air filters to keep Desert Storm on track

PAGE 106 1990 was a good year for distribution orders

PAGE 93 AMD's Subodh Toprani: "You'll see the transition from CISC to TISC start this year in earnest"

PAGE 81 The quality of European software is at least equal to that in the U.S., claims the EC's Michel Carpentier

COVER STORY/CEO SURVEY

75 **Taking the pulse of the electronics industry**
More than 3,000 copies of the 1990 CEO survey went out last October, and almost 600 came back. Those replies revealed a lot—not only about today's electronics CEO, but also about the ever-changing structure of the industry itself

EUROPE BUSINESS

81 **Eurocrats to reshape Europe's electronics industry**
As European electronics producers watch their share of the domestic market dwindle, a major policy paper to be released this month by the European Community may help revive the industry's competitiveness. Here are some of the men who hope to play pivotal roles in putting European electronics back in the international game

ASIA/PACIFIC BUSINESS

89 **Downturn slows computer business down under**
A sagging economy and the virtual lack of a domestic market are just two reasons why Australia's electronics industry has hit the skids. The federal government's Partnership for Development Program is one attempt to help electronics companies get back on their feet, but most analysts claim the government can and should do much more

MARKET PERSPECTIVES

93 **Autos and office products drive high-end market**
While automotive applications still account for most of the action in 8-bit embedded microprocessors, growth at the high-end 16- and 32-bit segments is being driven by office automation products and the need for faster performance

BUSINESS BAROMETER

105 **Components**
After a decline in the second half of 1990, a strong first half produced a gain

106 **Distributors**
Orders during 1990 made for a healthy gain in distribution

DEPARTMENTS

5 **Inside Business**
100 **Advertiser Index**
103 **My View**
Sushi economics
108 **Viewpoint**
Keep our defenses on the ground

COMPANIES IN THIS ISSUE

99 **An index of the companies covered in this issue**

EDITORIAL STAFF

Publisher: Frank J. Burge

Editor: Jeffrey Bairstow

Managing Editor: H. Garrett DeYoung

Senior Editors: Linda Stallmann (Financial), Rick Whiting, Barbara N. Berkman, Teri Sprackland, Elizabeth B. Baatz

Associate Editors: Peter L. Burrows, David Webb

Assistant Editors: Barbara Jorgensen, Xiong Xiaoge

Copy Editor: Elaine M. Cummings

Contributing Editors: Dwight B. Davis (Seattle), Madeline Franchi (Cahners Economics), Sarah Glazer (Boston), Julie Handelman (Cahners Economics), Nancy Rutter (San Francisco), Linda Bernier (Brussels), Paula Doe (Seattle), John Farrell (Cahners Economics)

Consulting Editors: Alberto Socolovsky, Allen Furst

Senior Production Editor: Karen J. Covey

Assistant Production Editor: Maura A. Baker

Editorial Assistant: Jean O'Brien

ART STAFF

Art Director: Michael Roach

Associate Art Director: Carla Aguilar Leeder

Staff Artist: Michele G. Kane

EDITORIAL OFFICES

Boston: Cahners Building
275 Washington Street, Newton, MA 02158
(617) 964-3030 Telex: 94 0573 CPC BSN
Fax: (617) 558-4327 MCI: EBBOS

San Jose, Calif.: Teri Sprackland, David Webb
Sherman Building, 3031 Tisch Way, Suite 100,
San Jose, CA 95128 (408) 243-8838

Northwest: Dwight B. Davis
2924 Queen Anne Ave., N.
Seattle, WA 98109 (206) 284-5130

London: Barbara N. Berkman
27 Paul Street
London EC2A4JU England 011-44-71-628-7030
Fax: 011-44-71-628-5984

PRODUCTION

VP Production: Wayne Hulitzky

Director of Production/Manufacturing: John R. Sanders

Production Supervisor: Andrew A. Jantz

Production Manager: Betsy Harkins; (617) 964-3030

CIRCULATION

Circulation Manager: Ann Ward
44 Cook Street, Denver, CO 80206
(303) 388-4511

Total Circulation: 77,804

REPRINTS

ELECTRONIC BUSINESS articles are available on a custom printing basis at reasonable prices. Contact Andrea Markwitz, Cahners Reprint Service, Cahners Plaza, 1350 E. Touhy Ave., P.O. Box 5080, Des Plaines, IL 60018 (708) 635-8800

Electronic Business can be purchased on 35mm microfilm through University Microfilms Int. Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, MI 48106

A close-up look at your competition

How often have you wished you could get inside the heads of your competitors for just a few minutes? What would it be worth to you to find out about these men and women's strategies—not just their plans to get through the next few years, but how they are laying the foundations that will assure their companies' growth and prosperity well into the 21st century?

Senior editor Elizabeth B. Baatz: A baptism by fire

That, in effect, is what the editors of ELECTRONIC BUSINESS did in producing our second annual CEO survey. Using surveys, roundtable discussions, and personal interviews, senior editor Elizabeth B. Baatz and contributing editor Bruce C. P. Rayner teamed up with Ernst & Young's high technology practice to explore the minds of nearly 600 top electronics executives.

The exercise was a sort of baptism by fire for Elizabeth, who joined our editorial staff just as the responses were pouring in. An economics graduate of Trinity College, Elizabeth is a former researcher with Data Resources Inc. and Cahners Economics, the research and forecasting arm of Cahners Publishing. Elizabeth barely had time to move into her new office before being swamped by the task of converting the thousands of raw data points into coherent copy.

Specifically, CEOs and other top executives talked about their industry and their companies from three perspectives—competitiveness, technological innovation, and organizational structure—and then elaborated upon how each of these factors have an impact on U.S. companies' standing on the world electronics scene.

The news isn't good. With a few exceptions, we didn't like what we found out, and chances are you won't either. While executives try to have a rosy outlook of the U.S. electronics industry over the next few years, it seems that there isn't a lot to be optimistic about.

Most executives pay lip service to the idea of competing through globalization, for example, but a whopping 93% of the industry's 1990 capital budget is pegged to domestic facilities, not overseas expansion. While more than half of our respondents cited first-rate technology as the sine qua non of today's successful electronics company, 40% predict a decline in U.S. technology during the next five years. And although product quality is seen as a hallmark of organizational excellence, only a handful of companies have set out for the Malcolm Baldrige National Quality Award.

"Every CEO worships at the altar of customer satisfaction and product quality," says Baatz. "But more electronics companies need to move from prayer to actually *doing* something . . ."

H. GARRETT DeYOUNG, managing editor

ELECTRONIC BUSINESS® (ISSN 0193-6197) is published twice a month, except monthly in December, by The Cahners Publishing Company, A Division of Reed Publishing USA, 275 Washington Street, Newton, MA 02158-1630. Terrence M. McDermott, President; Frank Sibley, Senior Vice President/General Manager, Boston Division; Jerry D. Neth, Senior Vice President/Publishing Operations; J.J. Walsh, Senior Vice President/Finance; Thomas J. Dellamaria, Senior Vice President/Production and Manufacturing; Ralph Knupp, Vice President/Human Resources. Circulation records are maintained at Cahners Publishing Company, 44 Cook Street, Denver, CO 80206-5800. Telephone (303) 388-4511. Second-class postage paid at Denver, CO 80206-5800 and additional mailing offices. **POSTMASTER:** Send address corrections to ELECTRONIC BUSINESS®, PO Box 173377, Denver, CO 80217-3377. ELECTRONIC BUSINESS® copyright 1991 by Reed Publishing USA; Ronald G. Segel, Chairman and Chief Executive Officer; Robert L. Krakoff, President and Chief Operating Officer; William M. Platt, Senior Vice President. Annual subscription rates for non-qualified people: USA, $79.95; Canada, C $99.95; other countries, $120 per year; $100, air mail surcharge. Except for special issues where price changes are indicated, single copies of regular issues are available for $10.00 (USA, Canada/Mexico and foreign). Please address all subscription mail to Eric Schmierer, 44 Cook Street, Denver, CO 80206-5800. Cahners Publishing Company, A Division of Reed Publishing USA • Specialized Business Magazines for Building & Construction • Research • Technology • Electronics • Computing • Printing • Publishing • Health Care • Foodservice • Packaging • Environmental Engineering • Manufacturing • Entertainment • Home Furnishings • Interior Design. Specialized Consumer Magazines for Child Care • Boating • Wedding Planning.

VBPA ABP

will rise 7.7% in 1991, following two years during which growth came in at less than 3%. Henderson argues that the U.S. computer industry has suffered in the past 24 months from a lack of product vitality. He expects a boom of new hardware and software introductions to help PC, workstation, notebook, and mainframe makers counteract the effects of an economy-wide recession.

Maddy Franchi, an economist with Cahners Economics (ELECTRONIC BUSINESS's forecasting unit), also thinks 1991 will be better than 1990 for computer makers. She predicts computer and office equipment shipments will increase 4.4% this year, twice as fast as in 1990. Although optimistic, Franchi's forecast has been downgraded because of the war. "The recovery that was in the making prior to the Gulf crisis is now at a standstill," she says. "Computer employment is at its lowest level since 1980, PC delivery times have fallen, and computer prices continue to erode." Her optimism for 1991 is based on the prospects for lower interest rates, growing exports, and balanced inventories.

The forecasts for computers depend heavily on the willingness of businesses to invest in upgraded equipment. If investment plans are scaled back because of the war, computer makers could be saddled with another year like 1989. For many computer employees, that means the threat of a pink slip won't go away soon.

ELIZABETH B. BAATZ

HOME OFFICE

Home-office buyers moving to mail order

SAVVY home-office workers are relying more and more on factory-direct mail-order companies when it comes to shopping for their phones, faxes, and PC equipment, but there is still hope for retailers in the home-office electronics market.

Since 1988, sales by mail-order companies and warehouse clubs have grown at annual rates of 56% and 143%, respectively, says vice president Marc Regberg at Venture Development Corp. in Natick, Mass. The big reason: lower prices. A full 70% of home-office workers told VDC pricing was the most important criterion in future purchases.

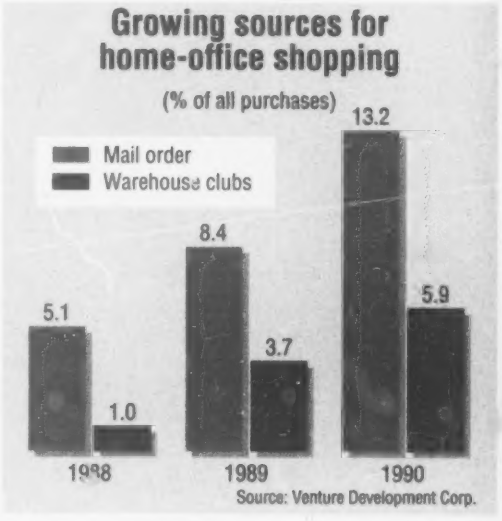
But that doesn't mean these customers are settling for cut-rate quality. "These are very technologically sophisticated shoppers," says Regberg. Nor does the issue of service give retailers much of an advantage, says VDC analyst Keith Kuzmin. There are few differences in service from retailer to mail-order, he says, since most retail chains provide little direct customer support; most buyers wind up going to the manufacturer with technical questions or paying extra for third-party extended warranty contracts. Besides, mail-order customers have the same OEM warranty coverage as retail customers, and some mail-order companies offer their own telephone technical support services.

In addition to offering lower prices, mail-order companies are functioning on lower profit margins. According to VDC, the average gross margin on a fax machine is 14% for mail-order companies and catalog showrooms, versus 20% for mass merchants, 25% for office-equipment dealers, and 27% for consumer electronics stores.

One successful home-office direct marketer is Hello Direct, a San Jose-based vendor of business telephone accessories. The company introduced its catalog in 1988, and although president Allen Batts won't give exact sales figures, he says Hello Direct more than doubled its revenue from 1989 to 1990.

And that's in a sluggish market. The Electronic Industries Association says revenue growth for telephone accessories has actually declined since 1988, when sales peaked at $270 million. Batts attributes Hello Direct's success in part to its decision to market products strictly as business productivity tools for home-office workers and small companies.

Speaking of telephones, AT&T is no slouch when it comes to direct marketing to the home office. Ma Bell puts out a newsletter directed to home-office users, along with an 800 number for technical support and questions. Users can buy products directly through an AT&T catalog.



Regberg's warnings drew concern from retailers at the recent Consumer Electronics Show in Las Vegas, where he spoke on the home-office outlook. "Ultimately it's the retailer that gets hurt," he said. "But are they doomed to oblivion? No."

Retailers should realize that in the home-office market they are dealing with a very select group of consumers. If they choose to court those consumers, said Regberg, they could fight back by launching their own mail-order line. One cost-effective technique might be to work with their own equipment vendors, using warranty information to assemble a database of potential customers.

One thing that hasn't worked so well for mail-order companies is the opening of their own showrooms. "The showroom is starting to lose money for these guys," says Regberg. "Some who tried to do both are in trouble."

JOHN PARKER

PRODUCTION COSTS

Smarter buying cuts materials costs

TWENTY U.S. manufacturers, including some of the nation's top electronics companies, have cut materials costs by as much as 30% through long-term pacts with suppliers and improving design techniques.

That was the finding of a study by

THE CEO AGENDA

CONTENTS

Threatened by stiffening competition, rapid technological change, and a waning infrastructure, what are CEOs' strategies for survival? Top executives from nearly 600 companies addressed this and many more issues in the second annual ELECTRONIC BUSINESS/Ernst & Young CEO survey. In-depth interviews and survey data provide insights into the health and future prospects for U.S. electronics and computer companies

|34|

What makes them tick, and other insights into today's CEO

The electronics CEO knows that reacting to change is no longer good enough. Instead, this breed of executive insists on setting the rules and the pace of today's competitive climate

|44|

Facing off against the competitive challenge

Competition is intensifying, and more CEOs than ever are gearing up to compete against Japan and Europe by 1995. What are they doing now to prepare for the race?

|52|

U.S. technology is tops now, but CEOs worry about the future

Everyone agrees that U.S. technological prowess is critical, both now and in the future. Maybe it's time to choose between breakthroughs and incremental innovation

|60|

Magical management doesn't do it; tough decisions do

From the boardroom to the mailroom, CEOs are re-examining every facet of their companies. The number-one success factor? A well-trained, motivated employee

|75|

A few words on methodology

This year's survey provides a wealth of data (revenue trends, funding, and market segmentation) on the U.S. electronics industry of the 1990s

Writing an agenda for the 1990s

BY BRUCE C.P. RAYNER

Electronics CEOs are grappling with some tough questions. Their answers will set the tone for the industry for years to come

The U.S. electronics industry has entered a new era. Slower growth, maturing markets, internationalization, and tough customer demands have redefined the marketplace. For the last few years, U.S. electronics executives have been facing up to this new competitive environment and writing new agendas for their companies. But as this year's ELECTRONIC BUSINESS/Ernst & Young CEO survey indicates, there is still much work to be done.

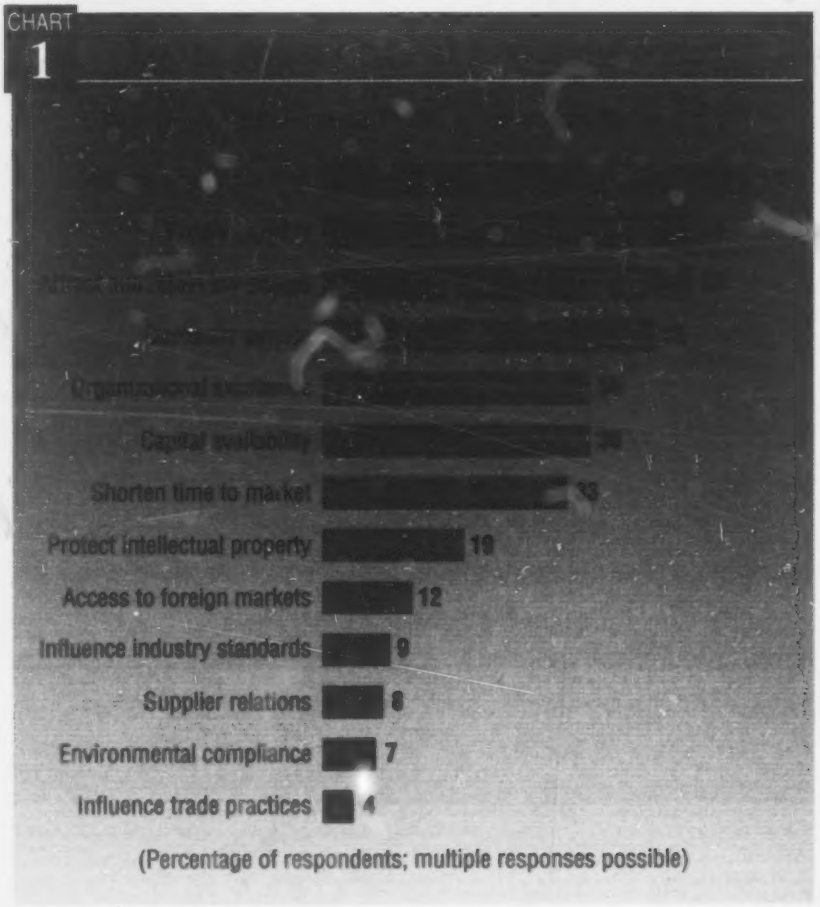
The second annual CEO survey of the U.S. electronics industry examines the challenges facing the industry and the strategic thinking of its chief executives. The survey looks beyond the buzzwords at how the trends are shaping the industry and how industry leaders are responding. It describes the actions industry leaders are taking to move ahead of the pack in the years to come.

The survey draws on data collected from a detailed eight-page questionnaire completed by nearly 600 CEOs in all major segments of electronics. In addition, ELECTRONIC BUSINESS editors consulted CEOs from large and small companies to discuss their companies' strategies. The combination of data and commentary is, in a sense, a reality check for those in the trenches.

This article explores the key findings of the survey and thereby lays the foundation for the report. The three articles that follow focus on the CEOs' responses to three compelling issues: maintaining a technological edge, adapting to the ever-intensifying competitive marketplace, and redesigning the organization for the 1990s.

Technology has always driven the electronics industry, and it is clear that technology will shape the industry for years to come. Whether evolu-

CHART 1



tionary or revolutionary, technology defines the market and all of the players. It is thus not surprising that most CEOs regard technological innovation as today's most critical issue for maintaining a competitive edge in the market. This view is held by executives in almost all segments of the industry and in companies of virtually every size.

But executives realize that technology alone no longer satisfies the customer; it is simply the price of getting into the game. The question arises that if every competitor enjoys roughly the same level of technological skill, how does a company distinguish itself?

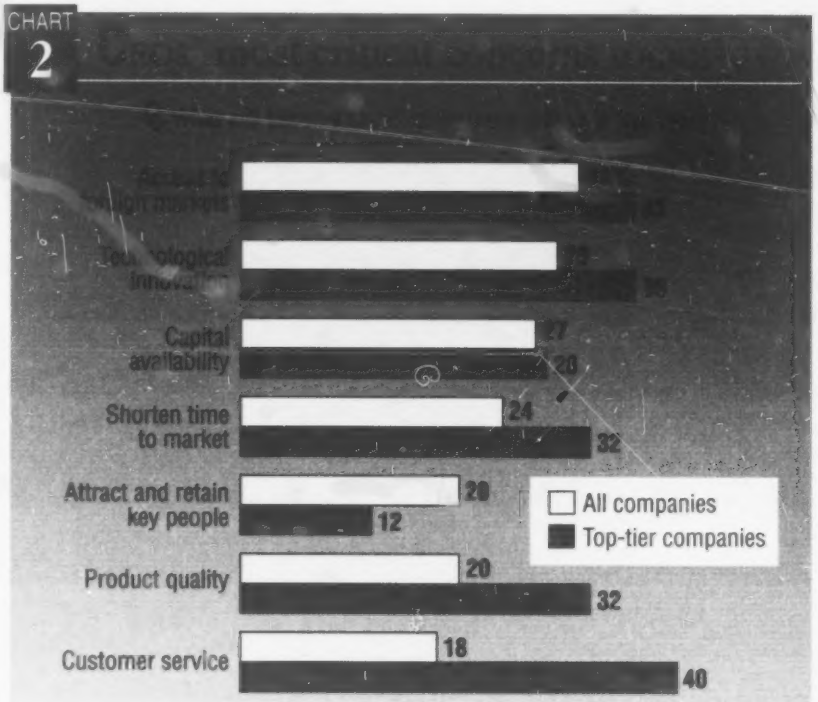
That question takes on special significance today, given the general perception that competitive pressures—mainly from Japan—are expected to intensify. While half of all CEOs surveyed believe their current level of technological innovation is very strong compared with their foreign competitors, the same number believes the country's technological edge is declining.

"The Japanese are very, very tough competitors," says Kent Black, COO of Rockwell International Corp. "They are very proficient in manufacturing skills and outstanding in technology, particularly when it comes to making something manufacturable at low cost. That is one of the most critical issues we face in telecommunications today."

In general, it is large companies such as Rockwell that are the most worried about technology. When asked to rate their competitive position in technology relative to foreign competitors, nearly half of these top-tier companies (those with annual sales over $300 million) think they currently have a very strong position. But forecasting their position out to 1995, the figure drops dramatically.

Why are these seemingly secure companies so pessimistic? One reason is that they already have the broadest exposure to foreign competition. They see first-hand the inroads that the Japanese are making in their markets and do not see the trend being checked any time soon. Another is that they often find it most difficult to adapt to changing environments—lumbering bureaucracies and responsibilities to an installed base make change a slow process. "The hot new products rarely come from the giants," asserts T. J. Rodgers, CEO of fast-track Cypress Semiconductor Corp., a $225 million maker of static RAMs in San Jose.

CHART 2



(Percentage of respondents; multiple responses possible)

That is a clear advantage for some nimble competitors. "Fortunately for us, bureaucracies within larger companies seem to have a natural tendency to kill motivation and innovation," says Robert Paluck, CEO and president of Convex Computer Corp. "We work very hard to do the things that DEC, IBM, and Cray can't or won't do to keep the employees happy and motivated."

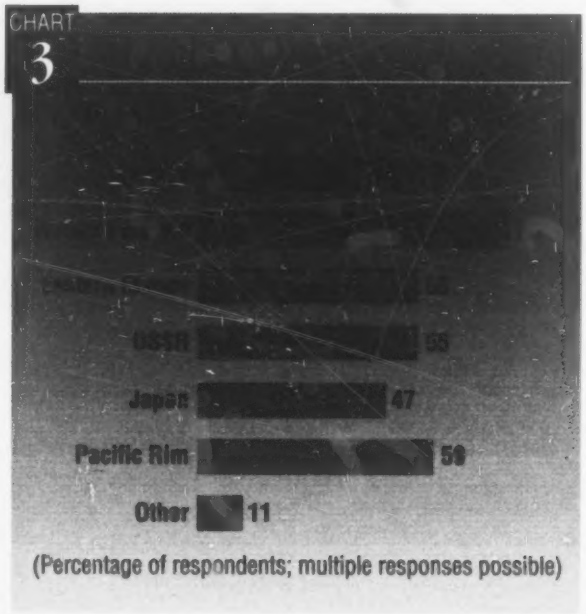
Despite such bravado, concern over technology development is widespread, particularly when it comes to efficiency of product design and development. Defining customer needs and ensuring product quality are the two most important product-development issues for CEOs, especially at the front end of the development cycle.

Chief executives admit that they are slow to identify and define market needs. Companies surveyed say they spend a disproportionate amount of time redesigning products and often end up adding last-minute design changes. In a fast-moving marketplace, a slow design process can mean death in the marketplace.

To address this problem, there is a growing trend among leading-edge companies to coordinate product design and development with input from the customer in order to lock in the product definition quickly. For some, this means getting the design engineers into the field to talk to the customers; for others, it means bringing customers into the lab to share their visions.

In some cases, it even means changing the organizational structure. "We have recently put all our R&D effort under the leadership of marketing and sales," says Nicholas Nadolsky, CEO of Micropac Industries Inc. in Garland, Tex. "That is a frightening idea to most of us, but if we are not willing to do that, then we are not very market-driven."

Another major part of the product development issue is time to market and the speed with which design is



transferred to manufacturing. Shortening time to market is expected to become a much more critical issue among one-quarter of the survey respondents and is particularly critical for larger companies.

While concurrent engineering is receiving a lot of press, the survey demonstrates that the really big improvements still need to be made. Poor design for manufacturability is a significant cause for delay among 26% of the CEOs surveyed.

Another concern on the technology front is the deterioration of the basic educational system and the resulting drop in the quality of entry-level employees. Almost all CEOs interviewed are worried about the state of the educational system. They point to the added cost of basic training—including reading and writing—and the need for increased spending on retraining as some key concerns.

Educational deficiencies also appear in unlikely places. "English does not seem to be the first language of many of the engineering people. They have a hard time writing something that is understandable," says Richard Schaffzin, CEO of IC Sensors in Santa Clara, Calif. He encountered the problem when the company was writing documentation for the operation of equipment on the factory floor. "They are American-born and American-trained, yet their ability to write an understandable English sentence is not very good."

Even after the documentation has been satisfactorily edited, there is a problem with the reader not being able to understand the written word. To address the problem, IC Sensors has instituted a written test for all factory-floor job applicants. "If they can read English, it is a very easy test," says Schaffzin. "But we find that at least 50% of the applicants cannot even fathom what we are talking about."

Cozying up to the customer

Especially important today is the need to improve customer satisfaction. According to the survey, quality—as it relates to people, product, and organization—ranked immediately behind technology innovation as the critical issues for improving customer satisfaction and, therefore, maintaining competitiveness.

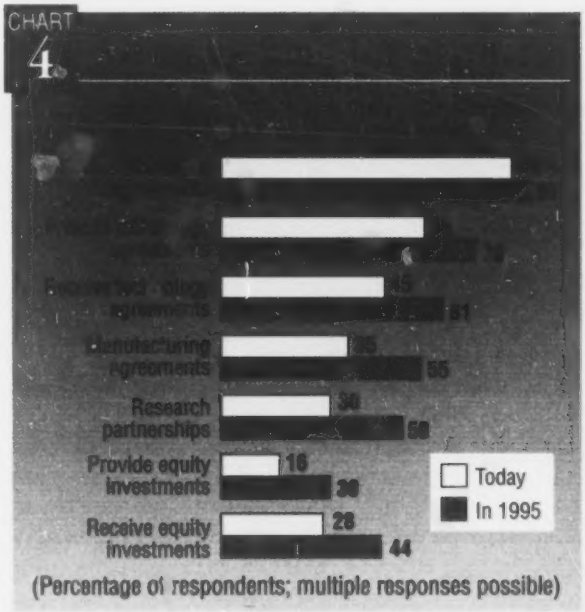
Pleasing the customer is one big reason for the astounding success of Conner Peripherals Inc., one of the fastest-growing companies in U.S. history. According to CEO Finis Conner, the secret of success for the disk-drive maker "has been our good relationship with the customer and our ability to configure products quickly and drive them in parallel with our customers to market faster than anyone else."

Quality and customer responsiveness are hardly new issues. But the ways in which electronics companies are moving to forge new corporate cultures based on a customer-driven culture *are* new. By definition, the customer-focused quality revolution touches all aspects of the corporation: cultivating employee motivation and empowerment, measuring performance of capital equipment and employees, improving supplier relations, and increasing the efficiency of R&D.

A bellwether of the focus on quality is the media hype over the four-year-old Malcolm Baldrige National Quality Award, which has become something of a benchmark of corporate quality in the United States. In fact, almost 50% of the companies surveyed agree that winning the Baldrige Award would improve their competitiveness.

So far, though, not many electronics companies are prepared to put their money (or their time) where their mouths are: Only 12% of the companies surveyed have either already applied or are planning to apply for the award.

The few that have taken the time to evaluate the Baldrige criteria and apply them to their operations claim



that the exercise is a revelation and a powerful motivator for change. "It permeates your entire corporation from a quality standpoint," says Jeffrey Goodman, former CEO of Bytex Corp. in Southborough, Mass. "Everything improves by default. It has to improve if you're serious."

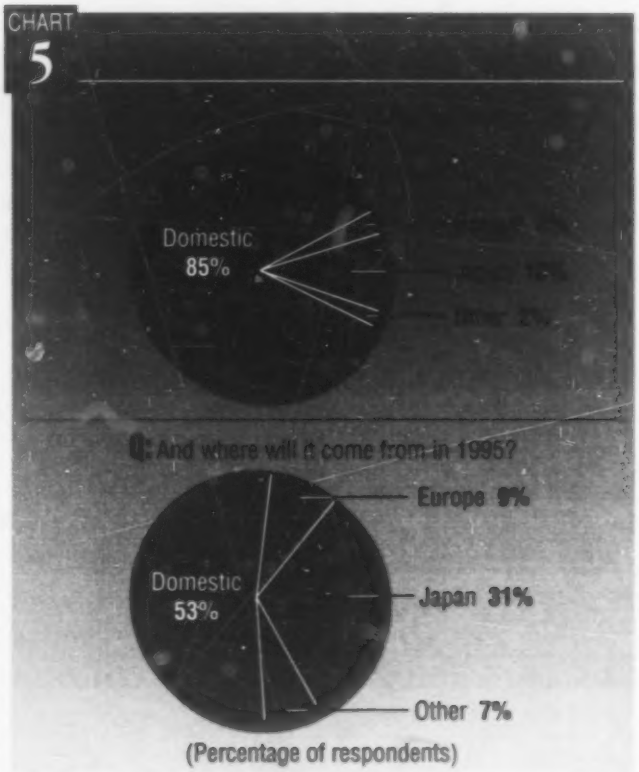
Admittedly, U.S. electronics executives have a long way to go before achieving a state of defect-free quality. Indeed, opinion differs as to whether this is even the goal. But everyone agrees that customer satisfaction has now joined technological innovation as a determinant of corporate survival.

Naively, perhaps, most CEOs surveyed are optimistic that their efforts to improve quality and organizational excellence will pay off. While the issue will continue to dominate the 1990s, only a few surveyed believe that customer service will become "significantly more critical" to their competitiveness in the near future. Still, no single answer for improving competitiveness stood out with a majority vote from the CEOs.

The exception was among the largest companies surveyed. Forty-five percent of the CEOs from the top-tier companies think customer service will become more critical over the next five years, while 32% believe product quality will become more critical. Many of these large companies are in the computer and peripherals or semiconductor and components segments.

This concern by top-tier companies should raise a warning flag for the industry that their quality efforts, to date, are not adequate in the face of intensifying international competition. While the largest companies presumably have the most extensive foreign presence, they also face the fiercest competition from foreign companies here at home. It can be argued that the need for continued attention to quality should be shared by their smaller brethren.

CHART 5



Currently, the vast majority of CEOs claim their primary competition comes from domestic companies. But by 1995, they expect that situation to have shifted dramatically: On average, 31% expect the Japanese to be their primary marketing adversaries in 1995. For companies with sales over $300 million the figure rises to 44%.

Three concerns

Besides quality, three issues that CEOs identified as becoming more critical to their operations over the next few years are already common themes today: the ability to access foreign markets, continued technological innovation, and the availability of capital.

There is little mystery about why CEOs attach so much importance to these issues:

- Most CEOs surveyed agree that foreign markets hold the only prospect for healthy growth in the near term. For virtually every company, geographic market expansion is a cornerstone for strategic thinking among several CEOs;
- Staying ahead of the competition on the technology curve is particularly important to those companies in both rapidly changing markets, such as voice and data communications, and also for large companies weighed down by older technology;
- Access to capital is worrisome to companies with huge capital needs, such as semiconductor companies, or small, struggling companies in need of money for growth.

But while much has been said about all three of these topics, companies have been slow to act. For example, few companies surveyed currently sell overseas. Of the total combined sales of these 582 companies, three-quarters are in the United States.

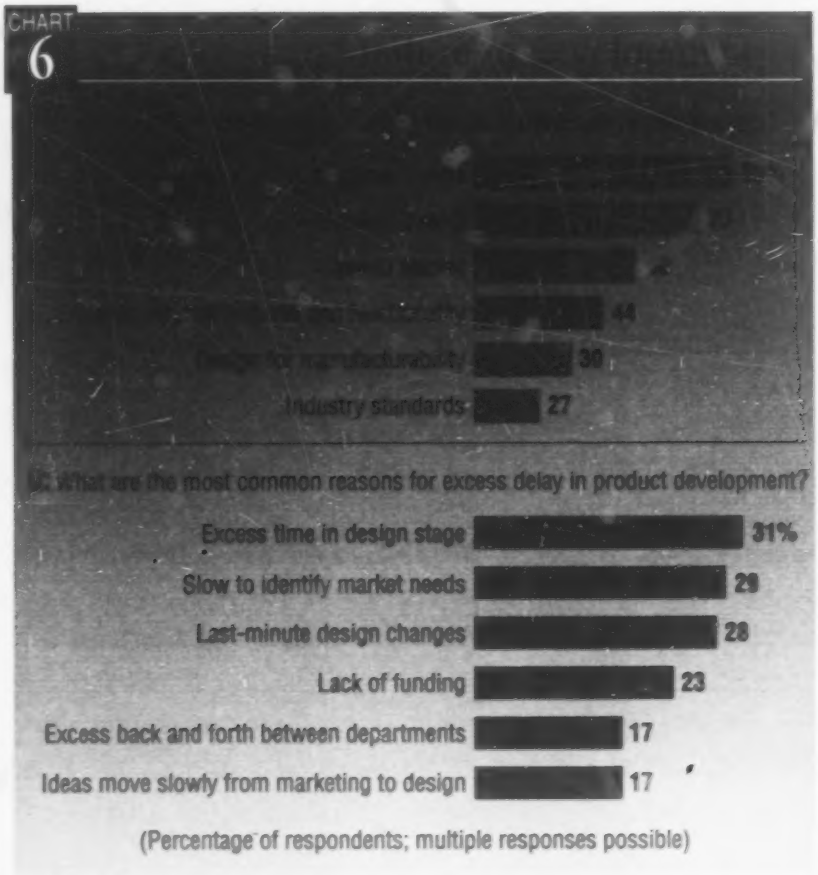
This lack of foreign presence is disturbing. Still, most of the companies that currently don't sell overseas plan to enter Western Europe; over half are gearing up to sell into the Pacific Rim and Eastern Europe. A full 47% of the companies surveyed that don't sell into Japan today plan to enter that market.

With global strategies still in early stages and with a recession in full swing, expansion plans are increasingly being scuttled. The tardiness of foreign expansion could be devastating to many companies.

How do these companies expect to penetrate foreign markets? Most look to exports as the primary source of foreign sales. Likewise, entry through acquisition is considered by only one-twelfth of those companies surveyed, and only the largest companies have the resources to build or expand operations overseas. Regardless, the survey says U.S.-owned electronics companies will be spending 32% of their capital budgets abroad by 1995, up from the 20% they now spend.

Hoping to bolster their alliances in manufacturing, marketing, and technology, not surprisingly, most of the U.S. companies anticipate their partnering activities will be in foreign

CHART 6


Industry standards 27
Q: What are the most common reasons for excess delay in product development?
Excess time in design stage 31%
Slow to identify market needs 29
Last-minute design changes 28
Lack of funding 23
Excess back and forth between departments 17
Ideas move slowly from marketing to design 17
(Percentage of respondents; multiple responses possible)

markets. Domestic alliances now account for 69% of the total, but by 1995 that will be trimmed to 58%, say CEOs. Nearly 20% of the alliances will be in Europe, up from 11% today.

Computer and peripherals companies expect to be among the most active in Europe, more than doubling their partnering efforts there by 1995. Semiconductor and components companies expect to ink the most deals in Japan.

Last but not least on the list of top issues is capital availability. In general, the concern over capital is inversely proportional to the size of the company. Developing companies face the biggest capital challenge: More than half of these companies' CEOs rank capital as the most critical issue today. But looking out five years, the picture shifts. Top-tier companies identify capital availability as a serious concern almost as often as developing companies do. The reason is that world-class production facilities, especially semiconductor fabrication plants, require huge sums of money.

It is uncertain whether enough capital will be available at the right price and from the most agreeable source. Right now the IPO market is tight and the cost of venture funds is high. What's more, the LBO frenzy of the 1980s is over; only the deals that make sound financial sense will be attracting backers.

Because of the poor outlook in the capital markets, nearly one-third of the CEOs surveyed expect to sell their companies by 1995. Most of the activity will be among the developing and small companies, although 6% of the larger companies expect to be acquired. While the majority of the respondents expect domestic acquisitors, 21% forecast their new parent will be Japanese, and 18% see a European takeover in their future.

For companies not contemplating a takeover, the only other source of help is the government. The majority of the CEOs surveyed look to the government to provide some relief by creating a permanent R&D tax credit and a capital gains tax indexed to zero for long-term investments. These demands are not new. The American Electronics Association, for one, has been harping about these issues for several years on Capitol Hill, with little progress to show for the effort.

Part of the blame goes to President Bush, say CEOs. Because of the administration's inability to convince Congress of the need to cut taxes and reduce the federal budget, the industry gives Bush a flat "C" for his management of technology issues.

Two-thirds of the CEOs surveyed would like an electronics industrial policy that includes a recognition of the strategic importance of the industry in trade negotiations as well as the tax breaks. Says Robert Anderson, CEO of GenRad Inc., "Until our government understands that we are playing by different rules than the Japanese and the Germans, we are going to increasingly lose market share in most of our technology markets."

While Anderson's views are echoed widely, there is a consensus among industry leaders that *direct* government meddling is unnecessary and undesirable. For instance, over three-quarters of the respondents reject the need for a government-backed technology-oriented venture capital fund, higher spending on basic research by the government, or the creation of a MITI-like trade institute.

Robert Galvin, former chairman of Motorola Corp., has put forward the idea that the government's role should be to place its imprimatur on certain desirable objectives but let industry take responsibility for implementation. Galvin points to the Malcolm Baldrige Award as a prime example: In this case, the government has given its blessing, but the award is privately funded and privately administered.

Many CEOs insist that the government must take a more proactive role in the industry's well-being for it to survive the 1990s. How they position themselves and what actions they take are the focus of the remainder of this study. □

A blueprint for COMPETITION

BY BRUCE C.P. RAYNER

KEY FINDINGS:

- ☐ *U.S. companies are ill-prepared for increased foreign competition*
- ☐ *Innovation and quality define the competitive company of the '90s*
- ☐ *CEOs worry most about innovation, capital availability, and foreign markets*
- ☐ *Top goals include fine-tuning core competencies and teaming up with suppliers and customers*

For today's electronics company, competition comes in many shapes and sizes: from large players and small, from vertically integrated and niche companies. And unlike years past, your toughest competitors are just as likely to be based halfway around the world as on the next block.

Are CEOs worried? You bet they are. They see foreign competitors eating away at their markets and beating them in terms of customer satisfaction and quality. In response, most CEOs have focused on efforts to trim costs and improve product quality.

But these efforts are only the beginning of a major rethinking of the U.S. corporation and a redefining of the rules of competition. Hal McInnes, chairman and CEO of AMP Inc., sums up the situation this way: "To be a viable competitor in the future, quality must be a given. You absolutely *must* be world-class in quality or you won't survive." The survivors, in other words, will be the companies that consistently meet or exceed customer expectations by offering sophisticated, competitively priced products that are 100% defect-free.

Alas, there are not many such companies out there, according to the 1991 ELECTRONIC BUSINESS/Ernst & Young CEO survey. In fact, the average U.S. electronics company paints a pretty bleak self-portrait. While most companies recognize that technological innovation, product quality, and customer service are crucial to competitiveness, many claim to be playing a perpetual game of catch-up with their foreign rivals.

For instance, 65% of all CEOs in the voice and data communications segment rate technological innovation as most critical to competitiveness, and 44% think that innovation will become even more important within the next five years.

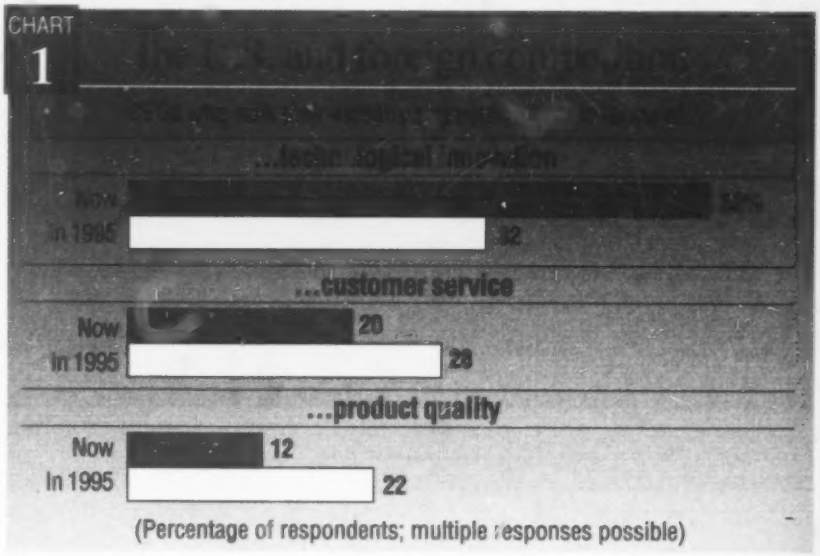
But these same executives see a marked deterioration in their technological edge during that period. The story is repeated in other industry segments and in other competitive criteria. Only 9% of all computer and peripherals companies now see Japanese companies as their stiffest competitors. But 49% expect Japan to be the number-one computer competitor in 1995.

Fighting back

Many companies are focusing their efforts on core competencies, shedding peripheral functions that add no value to their operations. For GenRad Inc., a maker of test equipment, that means focusing on test-equipment solutions. "We can add value by finding the best way to solve some specific test and measurement problems," says CEO Robert Anderson, "not by re-inventing user interfaces or computer architectures."

Concentrating on core competencies also means a closer relationship between suppliers and customers. As companies sharpen their focus, the reliance on cooperative R&D and product development increases proportionately.

The survey reflects this trend. Across the industry, alliances of all types are on the rise. Manufacturing agreements are expected to explode in the next five years: While 35% of our CEOs claim to have some sort of manufacturing alliance today, the figure will rise to 55% by 1995. Like-



wise in research partnerships, which will rise from 30% today to 50% in 1995.

As offshore competition intensifies, so does the need for producers in the United States to join forces with foreign companies. These foreign alliances throughout industry will become more significant over the next five years, especially between U.S. and European companies rather than between U.S. and Japanese companies.

For instance, semiconductor companies currently have only 9% of all their alliances with European partners and 29% with Japanese partners. But by 1995, those figures are expected to be 18% and 26%, respectively. Similar figures are projected in the computer and peripherals sector.

The trend for more alliances is motivated by the need for quicker product development and better communication between the supplier and the customer. "The whole key to competitiveness is really the relationship with the customer such that the customer is willing to tell us exactly where they are headed," according to Michael Cope, CEO of Interphase Corp. Cope claims that because of Interphase's status as a long-term developmental partner, customers provide information they would be unwilling to share with most suppliers.

In many of the companies, the focus is on concurrent engineering that involves cross-functional teams representing marketing, design, and manufacturing. But companies are increasingly realizing that unless these teams can lock in a design early on, they lose much of the value of the team effort. To address this issue, many companies involve the customer in the product-development cycle through written surveys and market studies.

But according to some CEOs, these techniques are grossly inadequate in gauging customers' expectations. What is needed is more one-to-one contact between engineering, management, and the customer. In one case, a CEO sent his engineering team to Comdex in Las Vegas to serve booth duty. The idea, says David Feldman, chief executive of Ampro Computers Inc., was for the engineers to meet customers face to face to get a feel for what the customer wants. "They came back with a totally different perspective of what's needed," he says.

The same closeness applies to salesmen. Stan Karandanis, CEO of Datacube Inc., says that, in theory, salesmen should listen, not talk. "Unfortunately, most of my salesmen talk," he concedes. "What you want to find out is what the customer needs. It's a communication issue. You have to work on improving [the salesman's] ability to listen through classes and through training."

This ability to listen to the customer is the key to Conner Peripherals' success, says CEO Finis Conner. Instead of relying on the traditional design-build-sell strategy of most technology companies, Conner employs a sell-design-build strategy. That is, customers tell the disk-drive maker exactly what they want, then

Robert G. Todd, Jr.,
Chairman and CEO, Flextronics Inc.

On reliability...

"Interestingly enough, reliability is the one area where there ought to be a lot more going on than there is between us and our customer. Reliability is a part of quality, but we've found that it doesn't get the same focus.

"We have only one customer who supplies us with reliability data on his products through his service department. Usually there are good reasons why they can't provide the data, but nevertheless, we usually don't get it. Therefore it's hard for us to do anything about improving our reliability or get back to our suppliers so they can improve *their* reliability.

"What we can't get from our customers is data on how our products have performed in the field. If we produced 30,000 of these things last year, we want to know what's failed and why. You just can't get that kind of information." □

Jim P. Manzi,
President and CEO, Lotus Development Corp.

On Japanese competition in software...

"It's loony tunes to think that [the Japanese] can conquer automotive engineering—and every other form of engineering—but won't figure out how to conquer software engineering. There is a big infrastructure built in; software is a priority for MITI. They are bringing in Chinese software engineers. NEC is doing it, Fujitsu is doing it..."

On software quality...

"If you took a poll asking what people thought the most important thing in the company was, they would say 'quality.' It transcends everything that goes on here. We spent $15 million testing 3.0 Lotus 1-2-3, which was twice the cost of development.

"The quality burden is so great on us because of the immense obligation we have to the installed base for quality, maintainability, and compatibility. So this has been a major fixation here since the beginning. There is a big requirement to do it more efficiently, and we are investing in ways to do that.

"For example, our biggest customer for Notes says the mean time between failure is not a relevant concept. What is relevant is mean time between repair. It doesn't matter if it breaks four times a day as long as it is fixed in 10 seconds. So before you write the applications software and networking software, you need a good understanding of the customer's quality requirements." □

Dr. Richard Schaffzin,
Chairman and CEO, IC Sensors

On measuring performance...

"Beyond communication and quality, the key piece of the puzzle is measurement. I think that people work better if they have a measurable goal. We've gotten it down to the point where every employee in the company has one or more measurable goals. And we're finding that people can do a much better job if you *expect* them to do a much better job. It's the old adage that work expands to fill the time available. People used to put out 200 units a shift because that is what they were expected to do. If we go back to those same people and say we want them to put out 1,000 units, miracle of miracles, they do it.

"So getting the measurements at every level of the organization, then patting them on the back when they do a good job and kicking them in the pants when they do a bad job, seems to work." □

Conner designs it to those specifications, produces it in volume, and ships it before the competition can get a look. "Our customers tell us they want a drive that has this form factor, this capacity, this performance, this cost, this reliability," says Conner. "So we know up front everything we need to know when designing a product."

Besides getting closer to the customer, some companies realize that it is how they measure themselves that is getting in the way of serving the customer. The solution is to redefine the metrics that measure their performance so that they become more customer-focused.

IBM has put in place a program called Market-Driven Quality that attempts to measure all operations on a customer basis rather than an internal basis. For instance, Big Blue has changed its software metric from bugs per million lines of code to problem days per customer month, permitting IBM to better gauge the customer's overall satisfaction with the product.

A company's competitiveness is measured by how global a player it is. Not only must it be able to source product from around the world, it must have an infrastructure which enables it to sell into all the major world markets.

But in most cases, U.S. global competitiveness is lacking. According to the survey, U.S. electronics companies sell an average of 75% of all their products in the United States, 11% in Europe, and 5% in Japan. Most plan to increase their foreign sales within the next few years, but by then it may be too late. Already, growth in the U.S. market has slowed. Big companies are pegging their growth prospects now on their foreign sales. Moreover, most plan to boost foreign sales through exports, a strategy that many experts see as inadequate. Consultants at PRTM, for example, insist that only companies that have a visible local presence in foreign markets will succeed.

That is just what AMP Corp. is planning, says CEO McInnes. He expects to maintain a 15% annual growth path for the connector giant by slugging it out in geographic markets. "We have excellent opportunities in the Asian market, mainly Taiwan and Singapore," he says. Like other companies, AMP is counting on Asia to post the biggest growth, followed by Europe and the United States.

But while that might work for a seasoned multinational, it is the exception to the rule, according to survey results. The picture of U.S. global manufacturing presence is even worse. Over 93% of all companies' 1990 capital budgets are for domestic facilities, and 81% of 1995's budgets will be pegged to domestic spending. This implies that the global infrastructure is not in place, nor will be any time soon. Without it, companies are held captive by domestic economic conditions.

Of course, there are exceptions. The Cherry Corp., maker of switches for the automotive industry, has pursued a global manufacturing strategy for years. "Flexibility is the byword here," says CEO Peter Cherry.

International sourcing is extremely important to Cherry, particularly in an era of fluctuating currencies. "You need to be able to change your sourcing decisions quickly," he says. The company practices what it preaches: It makes PC boards in India, stuffs them in Czechoslovakia, and assembles them in Germany.

Because so many high-technology companies lack a global presence, the question of government protection is a natural one. But, CEOs feel that the government should recognize that the U.S. electronics industry is

T. J. Rodgers,
President, CEO, and director, Cypress Semiconductor Corp.

On government restrictions...

"I have problems understanding the thinking in the Commerce Department. If you get Soviet scientists to come over here and let them access our technology—the guy that invented the ELBRUS 1 supercomputer might have to do a data capture on a Sun workstation—you'd be accused of exporting technology to him.

"We find some strange things as we get further into the laws of [the Single Market]. The premise is they'll force you to have a fab over there. From what I hear, the duty is 14% if you make it outside [Europe] and ship it in, but 9% if you make it outside but test it inside.

"Our first thought was to go for the fab and avoid the duty. Then we learned that if we make wafers over there and assemble and test them here, the duty jumps back up to 14%—with no credit for the fab at all. Their incentives go in the wrong direction for people to build fabs over there. The coercive utopians who are putting together the plans don't understand what kind of incentives they're creating..." □

Peter B. Cherry, President and CEO, The Cherry Corp.

On partnerships...

"I can point to several instances where I would say yes, there is something that transcends the traditional good customer relations in this era of partnerships. Partnerships is almost too strong a word, but you certainly get a preferred supplier status. You have some people who say it and mean it, and you have some who pay it lip service." □

strategically important to the country. In all, 63% of CEOs surveyed agree that the U.S. needs a defined electronics industrial policy.

However, that means electronics industry CEOs want the government's recognition that their industry is strategically important to the economic well-being of the nation. It does not mean the CEOs want the government to take an active role in the industry's management. Most CEOs are vehemently free-market supporters with the stipulation that the government should make it easy for them to raise capital and conduct R&D.

"I'm a very strong free-enterpriser. I think the federal government ought to stay the hell out of the way in almost all cases," says Kent Black, COO of Rockwell International. But he does allow for a few exceptions, one being R&D. "Right now we have a system that says you are going to be covering in your overhead rates to about 85% of what you are willing to spend in R&D, which is a demotivator in part." As chairman of the Aerospace Industries Association committee on R&D, Black proposes treating the R&D expense like any other expense, such as utility bills, instead of putting it in a separate category.

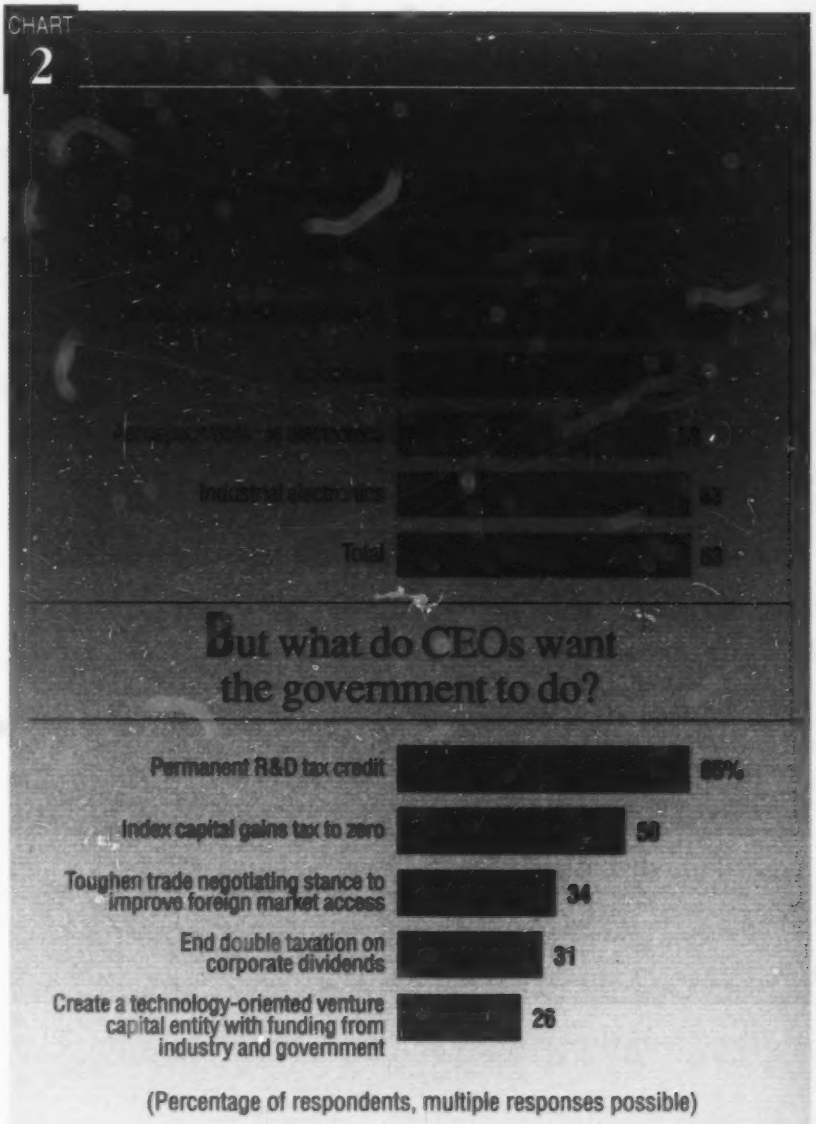
Some CEOs are more alarmist. "The longer it takes for the government to establish policy on technology, the more we will continue to lose our edge," says one CEO.

Reflecting this sentiment, a full 26% of the CEOs surveyed would like to see a technology-oriented venture capital entity created with funding from both government and industry. And 18% agree that the U.S. should set up a MITI-like institute—Japan's Ministry of International Trade and Industry—to coordinate trade. It is doubtful, however, given the Bush administration's position on government involvement in industry matters, that such a move will be made.

While the value of consortia was not addressed in the survey, the CEOs who participated in the roundtable discussions and interviews are still debating the issue. Some CEOs interviewed are concerned that the cooperative R&D efforts have been slow to produce results. Whatever else the industry can do, with or without government aid, remains to be seen.

Ultimately, the competitiveness of a company is based on its management and its products. While management can focus resources on maximizing profits or growing sales, the future rests in the hands of the customers. Quality and integrity of the product is key, and that is where U.S. companies still need a lot of help. □

CHART 2


Industrial electronics
Total
But what do CEOs want the government to do?
Permanent R&D tax credit
89%
Index capital gains tax to zero
50
Toughen trade negotiating stance to improve foreign market access
34
End double taxation on corporate dividends
31
Create a technology-oriented venture capital entity with funding from industry and government
26
(Percentage of respondents, multiple responses possible)

The rising price of TECHNOLOGICAL LEADERSHIP

BY BRUCE C.P. RAYNER

KEY FINDINGS:

- ☐ *U.S. technology is strong now but will decline in the next five years*
- ☐ *While the U.S. depends on technological breakthroughs, basic research spending is falling*
- ☐ *Closer customer contact is needed to define market needs and shorten product development time*
- ☐ *Networking will make new demands on U.S. technological expertise*

Technological innovation is the most critical issue for maintaining a competitive advantage, according to results of the 1991 ELECTRONIC BUSINESS/Ernst & Young CEO survey.

But all is not well on the national technology front. For one thing, half of the CEOs surveyed believe the U.S. technological edge is now declining, while 41% expect it to decline further during the next five years. Most of the concern is registered among CEOs who run computer, peripherals, semiconductors, and components companies. Yet compared with last year's survey, the CEOs are less pessimistic about the U.S. technological edge.

There is another warning flag. Over half of our CEOs believe technological innovation is currently a strength. But when asked to predict U.S. prowess five years from now, their confidence drops precipitously: Just one-third of the respondents believe their technology will be considered "leading-edge" by 1995.

Not surprisingly, Japan is seen as the biggest threat. But companies seem to be doing little to fight back. R&D spending as a percentage of sales, for example, is expected to decline over the next five years, and less will be pegged to basic research.

It is no secret that in times of belt-tightening you make what you have go further—using R&D funds more effectively and developing products more efficiently. One answer, say CEOs, is to team with other companies so that R&D efforts remain focused.

There are other tricks. CEOs talk about focus and the need for purging the "not-invented-here"' bias from their engineering departments; reinventing the wheel is too costly. CEOs look to cross-functional development teams and improved customer involvement as panaceas for solving their technology woes.

While these tactics are pursued vigorously, the survey identifies a few gaping holes in the electronics companies' ability to retain their technological edge. For one, CEOs admit they have a big problem with product development, primarily in capturing good market data and freezing the product design early in the design cycle. Bad market information results in last-minute design changes, a slowdown in cycle time, and lost business because the company was late to market. In all, 30% of the CEOs call their inability to identify and define market needs a "significant factor" in slow product development.

"Customer involvement," today's most popular buzzphrase, speaks to the issue of speeding the pace of product development. By bringing customers into the company to contribute their thoughts on what they want, product definition can be fixed early, and product development can go more smoothly. The more work done up front to define the product, the less work overall.

"I think the Japanese spend more time on the front end [than we do]," comments Gary Tooker, COO of Motorola Inc. "They get their plan together and stick with it so the total

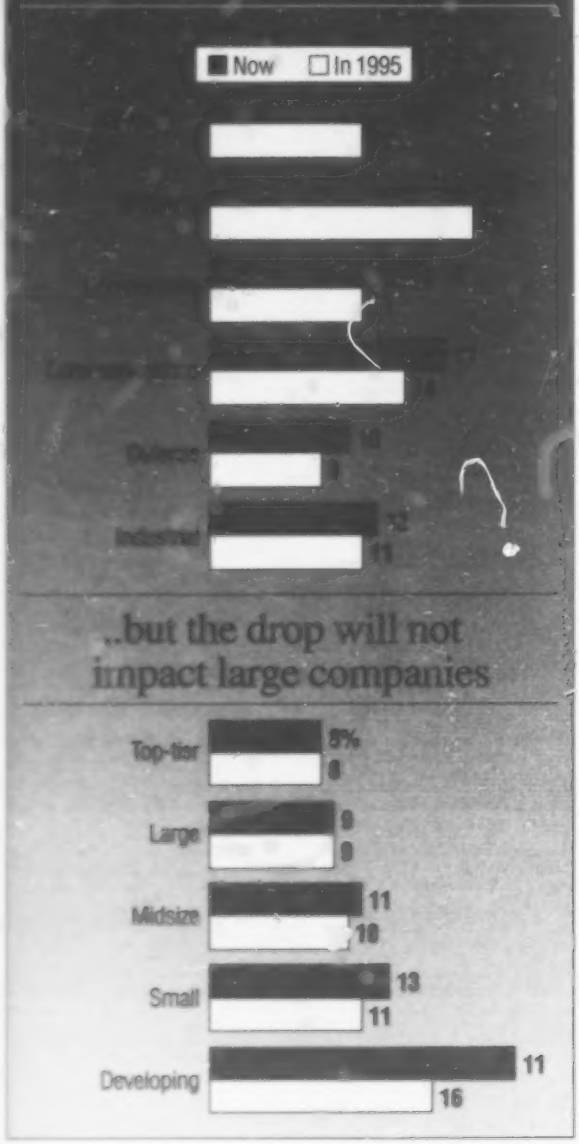
James L. Donald,
Chairman, president, and CEO,
DSC Communications Corp.

On rapid product development...

"If you come in with a project that looks right and proves itself out, we'll approve it in 30 minutes. It doesn't take mounds of presentation material or months of time before we decide...

"Our first cross-connect product came about when two engineers came to my office and said, 'We have an idea for a new product that fits in with what [the company] has been talking about.' I told them to get some data together. These two fellows made a presentation to our development head, our marketing guy, and me. In maybe 30 minutes to an hour we were persuaded, and we started the project two days later. It was the right project, it was very, very clear, and we brought the product to market before anybody else." ☐

CHART 1



elapsed time can be less—even though it looks like they spent too much time up front."

But except for the Japanese and the occasional U.S. company, is customer involvement a reality? Not for the larger companies, according to the survey. Last-minute design changes are a significant problem for over 40% of companies with sales over $300 million. The figure declines to just 17% for companies with sales under $1 million.

The problems of design capture are exacerbated by the fact that design for manufacturability is still considered a pipe dream by many CEOs. Despite talk of cooperation between design and manufacturing, 18% see lack of communication as a major obstacle to cutting cycle time.

Again, the problem is most acute among larger companies. While it is a concern to only 21% of the developing companies surveyed, design for manufacturability is a problem for 46% of companies with sales over $300 million.

Besides design for manufacturability, executives are most worried about supplier delays. While they tout their supplier "partnership" programs, poor delivery response times by suppliers are still a problem for many companies. This is complicated by the fact that some companies rely on foreign sources for many components. When these are in short supply, relationships break down.

While U.S. electronics CEOs are pessimistic about their technological competitiveness, there is less uncertainty concerning breakthrough technologies. Over three-quarters of all respondents believe that U.S. competitiveness is dependent on technological breakthroughs, and nearly 90% expect major breakthroughs in the next few years.

Historically, the Japanese electronics industry has not relied on breakthrough technology for its success. Instead, Japan focused on incremental improvements in both product and process; the nation has only recently increased its national focus on R&D. Now the threat from Japan comes from their ability to improve process technology and their investment in basic research for a myriad of advanced technologies.

If the U.S. electronics industry is right in believing it can continue

Robert J. Paluck, Chairman, president, and CEO, Convex Computer Corp.

On simultaneous engineering...

"We organize around a purpose, and the purpose is to get a system out before the competition can. An important part of this is simultaneous engineering. That is, manufacturing truly working with development and purchasing on the product. The third generation of product that we'll be coming out with next year is completely simultaneous engineering. The manufacturing, development, purchasing, and materials people have all worked together simultaneously for the last two and a half years. Marketing got involved a lot later, probably the last year, from a promotional standpoint. Marketing was also involved much earlier in the definition of the product.

"We have our development engineers working with the customers, finding out what they really want. There has to be an interpretation between what the customers say they want and what technology can actually provide. We also have to guess what the customers are going to want two years down the line. So it takes more sophistication from the engineer, but marketing is there [to help] too." □

churning out technological breakthroughs, then there is no cause for concern. But there are signs that the pace cannot be maintained. The reason: Breakthroughs depend on basic research and 61% of the CEOs surveyed agree that U.S. basic research is declining.

There can be pitfalls in becoming too enamored with or dependent upon technological breakthroughs. The Cherry Corp. in Waukegan, Ill., for example, has invested heavily in electroluminescent flat-panel displays for the past five years. "I relied on it too much as the engine for the future," says CEO Peter Cherry. "It's not going to jump-start us now, so it's best to get on with other things, such as semiconductors."

In semiconductors, Cherry has identified the most popular of the new technologies. In all, 66% of all CEOs believe that advanced semiconductors hold the most promise for the nation and are considered crucial for the future of the country by 65%. Other key technologies are advanced materials, advanced telecommunications, and high-performance computing. This reliance on U.S. semiconductor strength is rather alarming, as results from last year's ELECTRONIC BUSINESS/Ernst & Young survey indicate that the U.S. position in microprocessors was expected to drop drastically over the next five years.

Improving the efficiency of R&D funds is a central issue for many CEOs. For the most part, better utilization of funds which are earmarked for product development means a tighter focus on R&D. There are many implications of this strategy: closer technology ties between companies up and down the silicon food chain, more niche strategies, and acceleration toward and growing preference for standards.

"For the first time in our industry, we'll see more and more standards coming into place in the '90s," argues Robert Anderson, CEO of GenRad

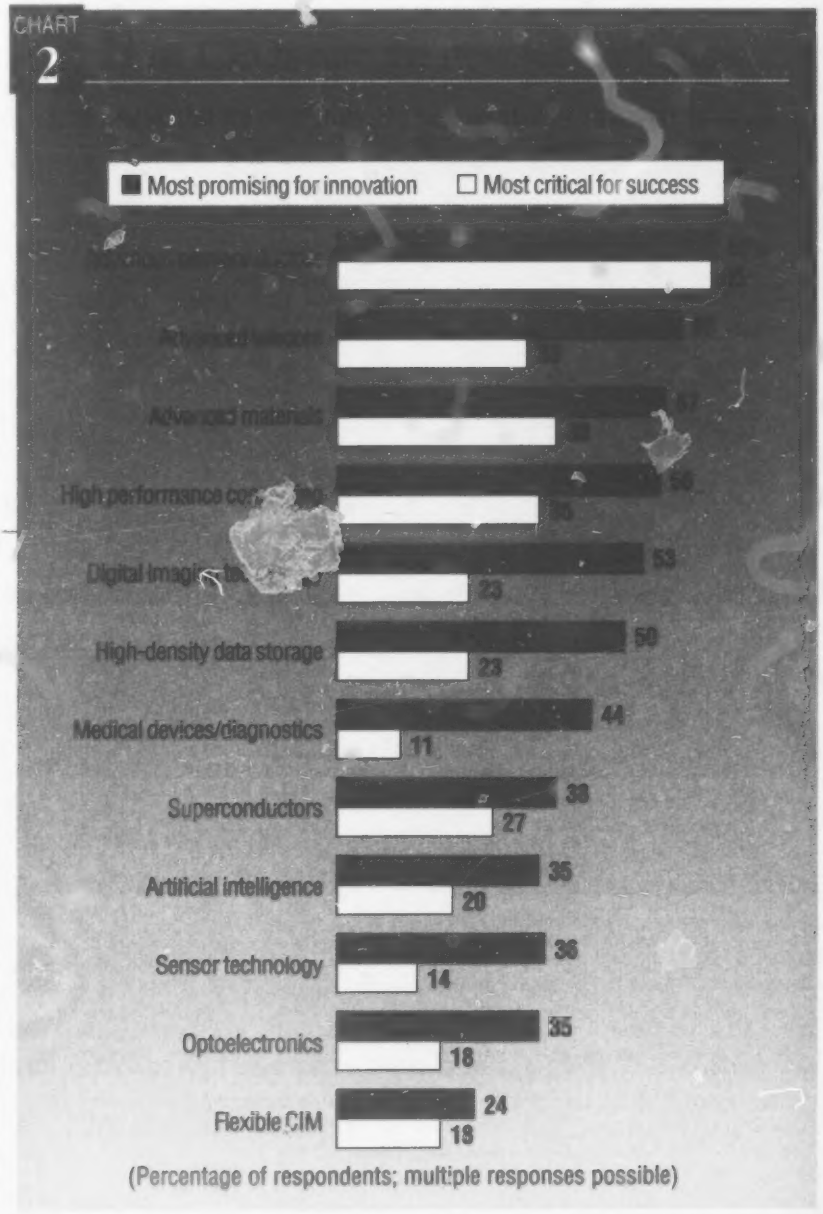
Robert E. Anderson, President and CEO, GenRad Inc

On wandering designs...

"One of the key factors that drives time to market is how good a job you do in the product definition up front, because if you don't have a nice crisp definition of what you want, you can waste an awful lot of time with a wandering design until it is finally done.

"We will be doing a lot of work in the future with quality function deployment, trying to make sure we get it right before we go off and start spending all that precious R&D money. QFD is a very good way of making sure that we are really listening hard, getting the right message, and then making sure that everybody on the team genuinely understands the message." □

CHART 2



(Percentage of respondents; multiple responses possible)

Inc. in Concord, Mass. Standards, Anderson says, will give GenRad a more focused R&D effort and a richer array of products.

Standards are the way in open systems too, notes NCR Corp.'s Elton White, executive vice president for marketing. "We think that the open systems trend revolves around standard interfaces that let systems work together," he says. "If you have islands of automation that exist in the enterprise today, then interfacing becomes important."

Networking is driving the open systems and standards trend. But networking raises new issues, especially for software companies. "We get about a million calls a year for technical support," says Jim Manzi, CEO of Lotus Development Corp. One of the challenges for companies like Lotus in the future will be providing technical support for networked customers. "The support requirements will increase by an order of magnitude," Manzi says.

David L. Feldman,
Chairman and CEO,
Ampro Computers Inc.

On offering fewer products...

"We are now on a fairly aggressive schedule of cutting our product offering. We are in the computer module business, but we were making things like enclosures and cables, trying to be all things to all people. By eliminating all those other things and focusing on the boards, we've become much more efficient and much more valuable to our customers as a board supplier.

"The efficiencies have allowed us to cut costs. In March, we had a 20% across-the-board price cut, and we had another one in January. This focusing has allowed us to have a schedule of introducing a new product a month. By focusing what we are doing, they are all very synergistic products.

"When we come up with the initial spec for a product, it's not just 'does it have all the bells and whistles and is it faster than someone else's?' In many cases we're introducing products that are slower or don't have some performance features, because we have tried to talk to the customer and find out what they want.

"I'm forcing more people to go to the customers, and that includes designers. I had our engineers do booth duty at Comdex last year. They talked to the customer and came away with a totally different perspective of what's needed out there and of the need to design products that will meet those needs. We are trying to make the whole company marketing-driven." □

Networking and other factors are also driving the need for technology alliances among electronics companies. The alliances between IBM, Digital Equipment Corp., and others for the Open Federation Unix project is a case in point.

According to the survey, over 50% of all companies have some sort of technology alliance; 56% are providing technology to another company, and 44% are receiving technology from another company. By 1995, nearly 70% of the companies surveyed expect to be providing technology licensing agreements.

Aerospace and defense electronics companies expect to post the biggest increase in the number of technology alliances in the next five years. Currently 52% of these companies provide technology to other companies and 42% are on the receiving end of technology licenses. By 1995, however, those figures will rise to 84% and 59%, respectively. The same picture, though to a lesser degree, is painted in the other major segments of the industry.

Most of the aerospace and defense electronics alliances are now with U.S.-based companies and will probably remain so. But in other segments, foreign alliances are expected to see considerable growth. For instance, in the computer and peripherals segment only 7% of all alliances are currently with European companies, and 17% are with Japanese companies. By 1995, those figures will rise to 20% each.

Along with foreign alliances comes the need for companies to set up their own R&D efforts overseas as markets or sources of talent shift. DSC Communications Corp. has its R&D in the U.K. but is now setting up a remote R&D center in Japan. "There are unique features that apply to that market," says James Donald, DSC's chief executive. While the office will be staffed by U.S. transplants initially, Donald expects to switch to Japanese nationals.

The reason for shifting R&D overseas? Local requirements, particularly in software. "It is kind of loony to think that someone sitting in Cambridge, Mass., would have a feel for [a foreign] market," says Lotus's Manzi. All Lotus products are "internationally enabled," meaning that the code allows for translation and supports an enriched international character set.

Japan was the first place Lotus set up its remote R&D, but the company is expanding in other regions. While Lotus did most of its translation work out of Dublin, it is now expanding across Europe and Asia. As the electronics industry becomes more software dependent, moreover, the need for globalization of development centers will increase. DSC's Donald notes that even the telecom business is becoming more software-intensive.

In other cases, the need for remote R&D centers is driven by demographic factors. "I see remote R&D as a growing trend," says T. J. Rodgers, CEO of Cypress Semiconductor Corp. in San Jose. "We need more and more engineers, and they simply aren't available in Silicon Valley at any price." Cypress has design centers in Startesville, Miss., and Austin.

While finding and retaining good technical people is an issue for all companies, most CEOs stressed that as long as a competitive salary was paid, the engineers would appear.

It is not clear whether that sentiment is just false hope. What is certain, however, is that more minorities and women joining the engineering ranks in the next century. How that will effect the structure of technology development in the U.S. electronics industry is too hard to predict. □

The changing face of the ORGANIZATION

BY ELIZABETH B.BAATZ

KEY FINDINGS:

- ☐ *Commitment to quality and customer satisfaction are the keys to organizational excellence*
- ☐ *CEOs lack reliable tools for gauging the effects of their companies' quality programs*
- ☐ *The successful corporation demands motivated, well-trained workers and excellence at the very top*
- ☐ *CEOs rank training and education as top priorities*

Given fierce global and domestic competition and the blistering pace of technological change, organization is more critical than ever for today's electronics company. What are today's CEOs doing to manage their organizations for survival and success?

Not surprisingly, the ELECTRONIC BUSINESS/Ernst & Young survey revealed no clear consensus on a single most critical strategy for companies to reach or sustain exceptional organizational performance. In other words, there is no magic answer. Most executives, however, offered two suggestions for helping to achieve organizational excellence: measuring customer satisfaction and committing the entire company to quality. Ironically, less than one-third of our CEOs agreed that either of these suggestions are very important to their strategies.

Not measuring up

Measuring customer satisfaction may be strategically important, but a significant number of CEOs in the survey are less than satisfied with their company's measurement techniques.

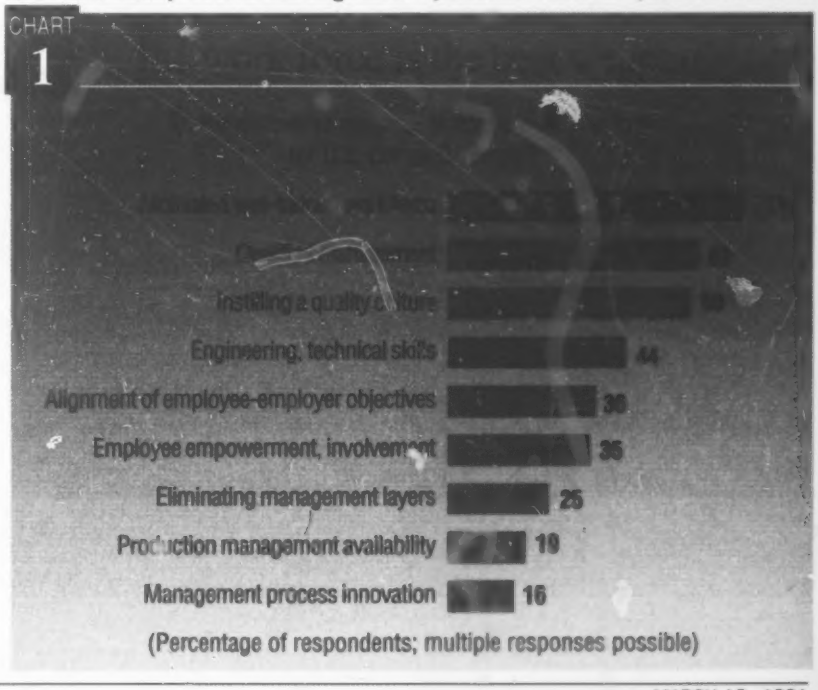
Although only a handful of companies in the survey have applied or plan to apply for the Malcolm Baldrige National Quality Award, over three-quarters of the CEOs surveyed said their company has a quality improvement program underway. In fact, a full 90% of midsize companies and nearly 95% of all large and top-tier companies in the survey have some form of quality improvement plan in the works.

But two-thirds of the CEOs admit to inadequate techniques for measuring product quality throughout the development process. Even among the largest companies with the deepest pockets, 20% are dissatisfied with their measurement process. By industry segment, companies in the area of industrial electronics, communications, and software expressed the most dissatisfaction with their product quality yardsticks.

As for measuring customer satisfaction specifically, only 29% of the respondents said that providing a system for measurement would be the most important part of the plan to ensure customer satisfaction. Also, only 15% indicated that linking employee incentive plans to customer satisfaction measures would be most important; instead, nearly three-quarters of the respondents said their most important initiative in order to ensure customer satisfaction was "to commit management to build a customer-driven organization."

The most popular method CEOs use to measure customer satisfaction may be considered a bit old-fashioned. Over 66% of the CEOs ranked personal visits to product users as

CHART 1



their most useful measurement technique. Another 49% said interaction with upper management in the customer's company was most useful.

The more scientific methods of measuring performance ranked lowest. Customer-service tracking systems, market research surveys, and field audits each were marked by less than one-third of the respondents as most useful. While electronics companies have become more market-driven, the industry's adoption of formal measures of customer satisfaction appears to be lagging.

Every CEO worships at the altar of customer satisfaction and product quality; pressure from foreign competitors has made this a must. But moving to actual implementation of measurement and controls still needs to happen by electronics companies.

Instead of measuring, executives are busy motivating, educating, training, communicating, hiring, and keeping talent. While the survey asked many questions about quality goals, measurement, and customer satisfaction, the most clear-cut consensus in the survey, the interviews, and the roundtable discussions were the issue of people. But electronics CEOs say employees are clearly the power behind any company's competitive edge and organizational excellence.

The survey asked CEOs to rank nine human-resource factors on importance in affecting their company's competitiveness. The number-one answer, with 73% ranking it most critical: a motivated, well-trained work force. Every industry segment except industrial electronics put the work force at the top of their list. By size, 85% of top-tier companies ranked the work force as their most critical competitive advantage.

After a motivated work force, the CEOs ranked qualified management as a competitive advantage. Among all companies, 62% ranked management as most critical. Only 51% of developing companies did so.

The CEOs had a lot to say about motivating employees. The methods range from the absurd (one CEO jumped into a vat of Jell-o in the company parking lot) to the sublime (another motivates by sharing the company financial statements with every employee). In the end, personal style becomes a very real factor in the race to hire the best and to motivate them.

For Peter Cherry president and CEO of The Cherry Corp., personal style is precisely what he looks for in his top staff. Says Cherry, "I'm not looking for someone who is book smart. I want someone who has that

Leon Machiz,
Chairman, CEO and President, Avnet Inc.

On reorganizing for efficiency...

"The biggest challenge Avnet faces is efficiency. Starting a few years ago, it was apparent that an aggressive posture with regard to efficiency was necessary. That was the reason I adopted the concept of 'hubbing.' I realized that just because we had a huge number of outlets, it didn't mean that we were necessarily structured correctly. Hubbing evolved as a result of addressing the bottom line and making sure that we're doing a sufficiently good job of keeping our suppliers happy.

"Hubbing just means moving out administration into centralized areas—centralized inventory, centralized product management, and centralized purchasing. There are two advantages: We can buy more effectively by buying in larger quantities and, by buying larger quantities, we found that we could collectively offer better terms.

"In looking at our organization, it was apparent that a number of facilities were not profitable. It also became apparent that we were really not allowing ourselves the advantage of critical mass. By being so disbursed we were, in effect, running a huge series of small businesses that didn't enable us to take advantage of centralized purchasing and centralized selling." □

Finis F. Conner,
Chairman and CEO, Conner Peripherals Inc.

On management structure and style...

"I was determined to have a company that was successful, not because of how much one or two people contribute, but because it has multiple functions and multiple strengths. If you look at Seagate today there are two key people. And if either one left or was hit by a truck, where would they be? So our success is to continue to build. We have the most senior, successful managers in the business. But we can't stop, we have to add more...

"[The decision-making process is] a mixture of disciplines. We are not a traditional organization where everyone brings their argument to the party. We vote on it. And I have one more vote than everyone else. But neither are we so loose. Instead we talk about it. We have a group called the corporate management committee that has all the key individual contributors in it—Squires, Schroeder, Holt, Neun, Almon, myself. We bring that group together on anything that has to do with strategic direction. We have to meet and agree on where we are going.

"You have to have the trust and confidence [in each other]. I guess if there is one phrase to describe my management style it is mutual trust. I have to trust John Squires who knows more technical information than I ever will. If we are making a technical decision, he has the lead, he has one more vote. When it comes to an operations decision, we turn to Bill Almon. For marketing, Scott Holt. I have input into all those. If I think it is contradictory to what I think is right, I will try to convey my views and why. At the corporate management committee we are all equal. We have never had a situation, with the exception of one, where I had to make a decision contrary to the consensus." □

entrepreneurial spark; someone who is constantly challenging the organization and the status quo; someone who suggests improvement, whether it's a new technology in assembly, a new product, a new selling technique, or a new accounting method. That's the kind of person who gives the company its culture, its stature."

Keeping those key employees after you have found them is another matter altogether. During the '90s this issue will become even more critical as demographic trends point to a labor shortage of U.S. entry-level engineers and other young employees. Competition for the best employees is already cutthroat and most employees switch jobs much more often than the employees of 30 years ago. So electronics companies may buy fewer gold watches for the 25-year veteran, but the costs of getting and keeping good employees will be higher.

Corporate culture and stimulating, challenging work are paramount to keeping good employees. Most executives agree with Michael Cope, CEO of Interphase Corp. "Salary is way down the list in terms of attracting and retaining really qualified people," according to Cope.

For Robert Paluck of Convex Computer Corp., maintaining that special corporate culture takes a lot of work. "Maintenance of the culture is totally a function of the energy you pour into it," he says. "The whole driving force behind this is that you don't believe you can have an intensely happy customer unless you have intensely happy employees. You can't have one without the other."

Donald F. McGuinness,
Chairman, Electronic Designs Inc.

On empowering employees and cycle-time reduction...

"I think that management's role is to empower people and not much else. When the management gets involved and starts saying the way it should be, almost invariably the people say, 'Well, I'll show you another way it's going to be.' The Japanese are pretty good at it. Culturally they're better at team playing and getting together than our culture is. So the trick is empowering people constantly in the organization.

"The other issue is a cross-divisional issue. Take cycle time. Cycle time involves all of [the employees] together, from sales to accounting. But everyone looks at their own piece, and it can be very difficult to see how it fits in with the total picture. So the big issue for my company is how to manage across the departments, because that is where the big breakthroughs are. One partial solution to both problems is to set up some kind of reward system for our employees. This is what we are working on." □

Elton White,
Executive VP of marketing, NCR Corp.

On project teams and decision making...

"For every new program, we put together a planning team which includes development, product management, and marketing. We put together what we call an integrated business plan which includes the marketing and development aspects. We've been doing this for about five years.

"NCR has had a management philosophy for some time that involves moving decision-making as far down the organization as possible. So one of the things we do is put together an organization that is responsible, that has a product charter. [The team] has a final decision on what the product should be that satisfies the market requirements. For that chartered area they have that responsibility. To facilitate this, we put together teams that work to get the right information and get the product to market fast. It's not the team's decision, but the organization's decision, on what the product is and the content of that product.

"So one of our objectives has been to move the decision-making down the organization. There are two conditions on that: [The decision maker] has to be at a level where the information is available to make that decision and at a level where the decision can be measured." □

Productivity pundits

Along with improving product quality, improving productivity remains a top goal with the CEOs who were interviewed. The success story of one large electronics company, Rockwell International Corp., inspires even the smallest electronics company. From 1980 to 1989 the number of people employed at Rockwell rose just 1,000, from 108,000 to 109,000. Yet over this same time period, revenue doubled.

Rockwell's COO, Kent Black, explains his productivity success story as "a lot of small ways of learning how to do things better and how to buy material better." One of Rockwell's improvements has been to set up a system of preferred buyers from whom Rockwell demands the highest quality.

By concentrating the buying power of all their operations into one corporate purchase agreement, by hiring purchasing people who are engineers, and by doing a multitude of small things better, Rockwell's productivity has soared. For example, at Rockwell's Tactical Systems Division in Atlanta, parts are no longer inspected on receipt; that responsibility belongs to the supplier. "In that way," says Black, "we've cut the hours to build a missile in half, and we've increased production about two and a half times. I think the head count in the division is down 40%."

The changing nature of the relationship with both suppliers and with customers has slowly but inexorably exerted its influence on the organizational structure of the electronics company. The trends of the '80s are changing the electronics company in the '90s: faster time to market; smarter, more quality-conscious consumers; increased foreign competition. The list continues on and on. But above all, the employee remains the key to the future success

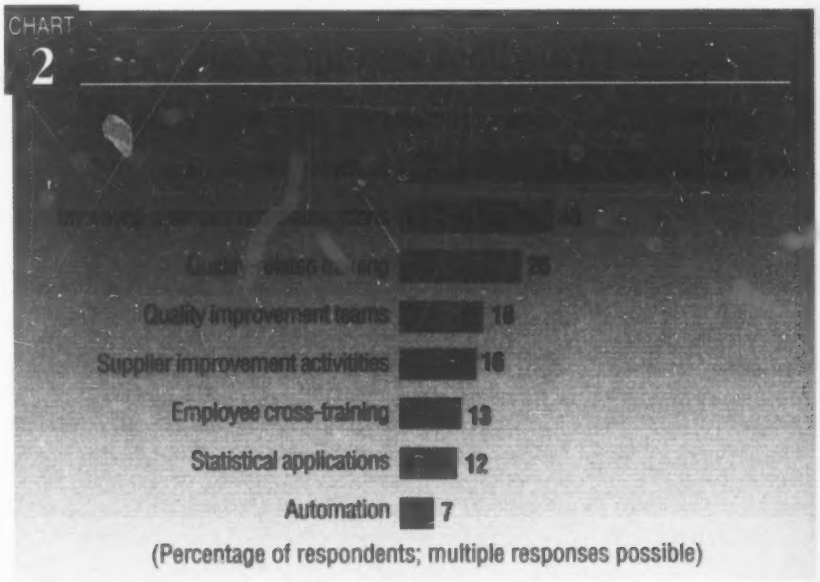
of the organization.

When asked which of eight techniques have been most successful in improving product quality, 76% of the survey respondents answered "employee involvement." The next most popular answer, with just 33% marking it as a most effective technique, was "improved customer communications."

With employee involvement so critical to the success of today's electronics company, training and education now rank as top priorities for the nation and the electronics CEO. Says Gary Tooker, president and COO of Motorola Inc., "There is a shrinking supply of technical talent, so one of the things we have to do is nurture the raw material. That's why we work on education. We spend about $60 million a year on education internally."

For electronics companies, which rely on a highly trained work force, the current state of the U.S. education system is a serious problem that many executives confront all the time. Some companies, like Motorola and Rockwell, have responded to the problem by increasing the amount of time and money spent on training. Others have begun more extensive testing of their work force before moving them into new positions that require more skills. And still others are importing their manufacturing engineers from abroad when they cannot find qualified American-born engineers.

CHART 2



(Percentage of respondents; multiple responses possible)

Frederick A. Krehbiel,
Vice chairman and CEO, Molex Inc.

On the global employee...

"We need more people with global experience. Without it, Molex managers and employees are limited in their opportunities. You can only go so far up the ladder without international experience. It is expensive sending people overseas, but you have to do it.

"I worry about finding the right people to assemble the global network, making sure things fit together. Whenever possible, don't centralize your operations. It is too easy to lose flexibility with your customers." □

Talk is not cheap

In the electronics industry, change shapes every CEO's day. While more traditional industries react slowly to a changing global environment, the electronics industry itself is predicated on the value of rapid technological change. Anticipating, managing, and communicating that change is a big part of every CEO's job.

David Feldman, chairman and CEO of Ampro Computers, sees communication as paramount. Last year, after a trip to the Far East, Feldman decided he needed to make some basic changes in his company in order to compete. He came back from his trip, cut his company's price list from eight to two and a half pages, and rewrote the business plan.

But it didn't stop there. Next Feldman sent out the new plan to every manager in the company and requested their comments. Communication, both to and from the CEO, gets Ampro's employees intimately involved with the changes and the success of those changes.

For small, domestic companies, the task of communicating is ingrained in their corporate culture. James Donald, CEO of DSC says, "Employees can come see me any time they want." However, he admits, "It's getting a little bit more difficult these days because I can't find a place big enough to get everybody together every quarter."

Once the company gets larger and goes global, communication becomes a much more difficult task. For Robert Todd of Flextronics, the cost of communicating well is high because it necessitates frequent trips to see his operations and engineering staff in Asia. In fact, face-to-face communication remains key, say the executives, no matter where staff is located or how big a staff you've got.

CEOs of the larger electronics companies make it part of their job to find ways to get the benefits of size while minimizing the costs. For Rockwell International, that has meant eliminating excess management layers. For Cypress Semiconductor, nurturing smaller, focused business groups within the large corporation has been successful. For Motorola, cross-functional teams of engineering, manufacturing, and marketing has made communication more efficient.

Managing change and preparing their organizations to fight the business battles of the '90s, electronic industry executives have their work cut out for them. To survive, all CEOs will be striving for organizational excellence as never before. □

Taking the pulse of the ELECTRONICS INDUSTRY

BY ELIZABETH B. BAATZ

Nearly 600 top executives discuss their companies' performances last year—and how they plan to compete in the '90s

One morning in October 1990, more than 3,000 copies of the second annual ELECTRONIC BUSINESS/Ernst & Young CEO survey left the San Francisco post office bound for electronics companies across the United States. By the end of December, 582 valid surveys—a 19% response rate—had been returned to Ernst & Young's high technology group.

The eight-page survey dug out details about how top executives view their companies and their industry with respect to competitiveness, new technologies, management strategies, and organizational plans. With more than 250 questions per survey, Ernst & Young's data-entry group keyed in nearly 150,000 data points. The computer, guided by Ernst & Young's Kyle Kelhofer, did the rest. The results are presented here.

Who did we survey? All the executives on the mailing list are located in the United States. Only top executives were questioned, and only one reply per company was accepted. Despite diversity in the industry, market segment and company size and location were controlled so that the final data would roughly represent the U.S. electronics industry.

As in the 1990 CEO survey, all major markets are represented. The computer and peripheral industry accounts for 18% of the total number of responses; when weighted by revenue, this segment accounts for 37% of the total. Aerospace and defense companies represent 10% of the total number of responses but 36% of the survey group's revenue. The semiconductor and components industries account for 18% of the responses and 16% of the total revenue. Industrial electronics contributed 23% of the replies and account for 5% of revenue. Software makers chipped in 18% of the responses but only 2% of total revenue.

The details of the market segments covered in the survey are outlined in the table below. The major difference between this year's and last year's CEO survey: We moved semiconductor equipment manufacturers from the semiconductor grouping into the industrial electronics grouping in order to conform to common industry categories.

Differentiating market categories by which the data was cross-tabulated and cross-sectioned made many an Ernst & Young principal and ELECTRONIC BUSINESS editor cross-eyed. Indeed, defining the elusive, ever-changing electronics industry is an issue that plagues data crunchers in Washington, industry trade associations, and virtually every other data-gathering organization around the world. We simply tried to follow

CHART 1

A detailed look at the markets covered in the survey

	Number of companies	% of number	% of revenue	% of employment	Segment definition (percentage of respondents)
Industrial	134	23.1	5.1	5.1	Test and measurement (57%), semiconductor equipment (23%), factory systems (13%), medical (7%)
Computers	104	17.9	37.4	25.3	Peripherals (56%), computers (44%)
Components	103	17.7	15.8	31.6	Semiconductors (45%), passive components (18%), printed circuit boards (9%), other components (28%)
Software	102	17.5	1.7	1.8	Software developers (66%), CAE/CAD (25%), systems integrators (9%)
Defense	57	9.8	35.8	31.7	Aerospace, defense warfare systems, defense communications
Communications	48	8.2	1.6	1.6	Telecom equipment (54%), network systems (46%)
Other	34	5.8	3.0	2.9	Consumer electronics (5%), contract manufacturing, R&D, and miscellaneous manufacturing (95%)

the industry standards proposed by the American Electronics Association and the Electronic Industries Association.

More surveys, of course, were received from the smaller, more prolific developing companies (those with annual revenue of less than $25 million). The remaining 40% of the surveys received ranged from midsize companies with $25 million to $100 million in revenue to the top-tier companies with $300 million or more in revenue.

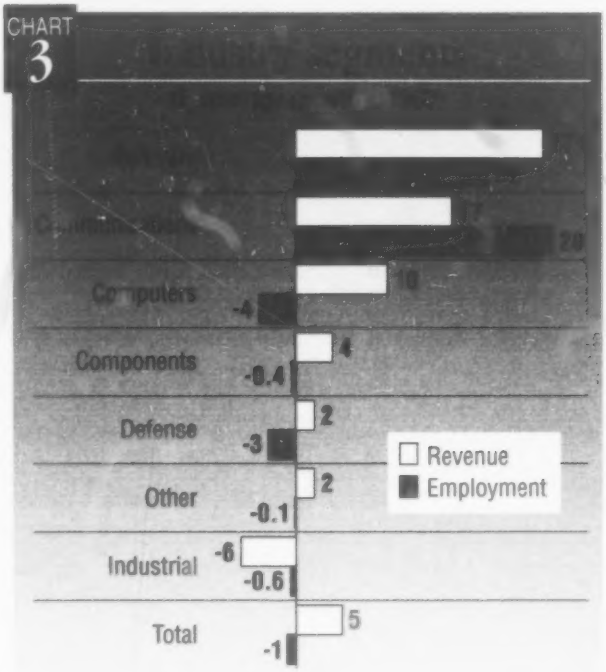
When categorized by type of funding, 22% of the surveys came from public companies, 59% from private companies, and 19% from subsidiaries. The public companies contribute 76% to the total revenue of the survey audience. Subsidiaries (of which 40% are foreign-owned) account for 18% of total revenue; the remaining 6% came from private companies.

The 1990 survey also gleaned more information about recent company performance than the 1989 survey, giving us an idea of the business environment our CEOs are facing. In 1990, as expected, top executives were under intense pressure because of weak revenue growth; for the most part, management responded by cutting back employment—CEOs in most market segments cut their payrolls in 1990. Only software and voice/data communication companies were able to buck the trend and increase employment (by 21% and 28%, respectively).

The survey revealed some interesting trends. Revenue for the sample in our survey rose 5% in the latest fiscal year from the prior year. However, software makers report an average 27% increase in revenue and manufacturers of voice/data communications claim a 17% jump. Computer and peripherals saw a steady 10% gain.

Manufacturers of semiconductors and components, aerospace and defense electronics, consumer electronics, and other products experienced below-average revenue growth of between 2% and 4% compared with 1989; after inflation, in other words, these markets actually were coping with a declining revenue base. The industrial electronics market faced the largest revenue losses, with a 6% drop. The surveyed companies got 23% of their revenue from foreign sales, with computer/peripheral and industrial electronics makers capturing 27% and 29%, respectively, from offshore customers.

CHART 3

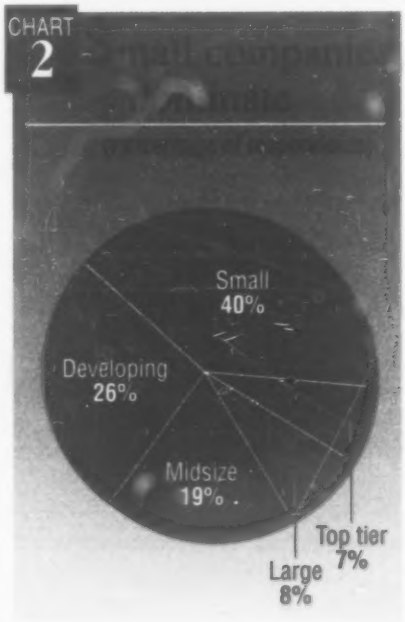


In any economic downturn, smaller companies generally are most susceptible to the perils of tighter credit, inflation, and business uncertainty. The 1990 results show the small companies are indeed under extreme pressure. CEOs from developing companies reported no revenue gains, while small companies watched revenue actually sink 21%. The surveyed companies who qualify as "top-tier" saw modest 4% revenue gains. Large company revenue rose 10% and midsize companies enjoyed a 21% rise.

What do all these figures on companies' recent performance indicate? The recession was in its early stages when the CEOs filled out the survey, but most of the respondents had been managing slower growth during the past fiscal year. As a result, it would have been understandable if their comments about breaking into foreign markets, managing technological changes, and becoming quality-driven organizations had been tinged with an air of desperation.

Instead, many CEOs expressed unbounded optimism about their employees' skills, their companies' niches, and their industry's future. □

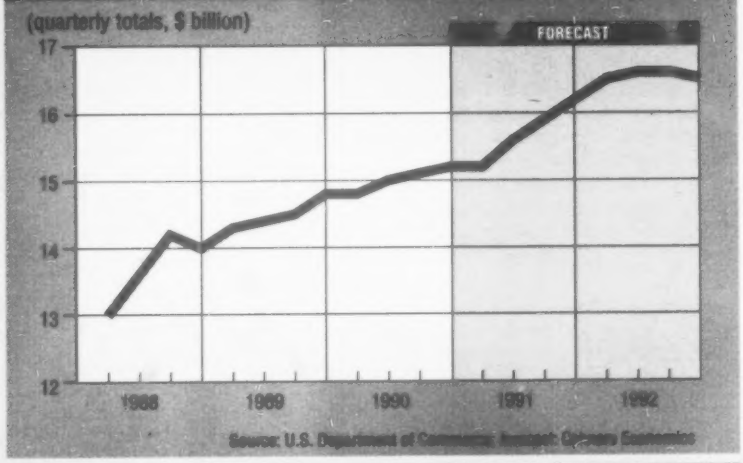
CHART 2



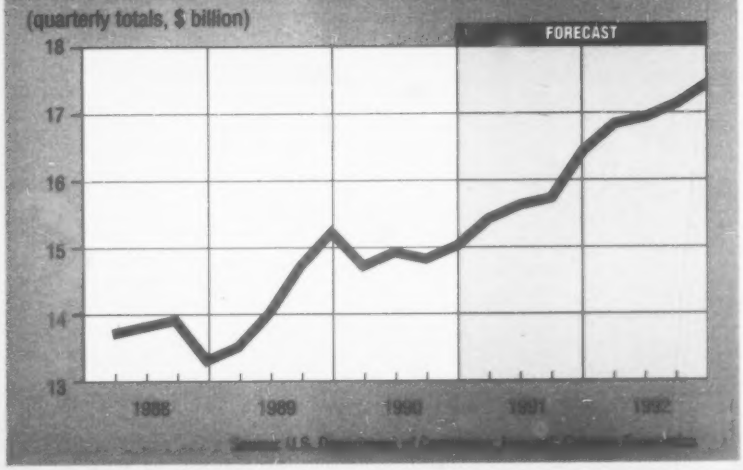
More details about this year's survey are available from Ernst & Young's high technology experts. You may obtain a complimentary copy of their report, *Electronics '91: Framework for a Winning Future*, by calling 800-3HI-TECH.

Did you miss out on the chance to participate in the CEO survey? Your comments and responses are critical. To add your name to our mailing list, please call ELECTRONIC BUSINESS at 617-558-4257 or Ernst & Young at 800-3HI-TECH.

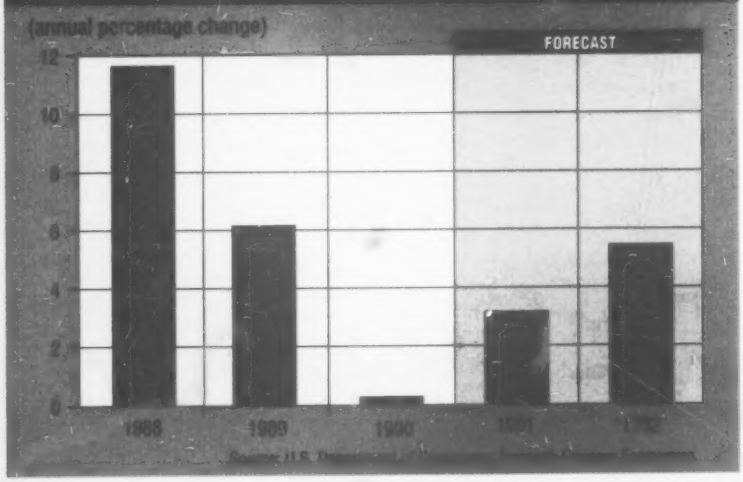
Electronic component shipments



Electronic component new orders



Electronic component inventory growth



Components demand seen rising in '91

Back in late 1989, hopes of an economic rebound loomed large when new orders for electronic components rose 14.5% above 1988 levels during the final quarter of the year—the strongest quarterly gain since the gangbuster growth rates seen in the first half of 1988.

Those hopes were dashed in 1990. The electronic component industry enjoyed only mild growth last year, which reflected the overall economic slowdown. New orders during the fourth quarter of 1990 dropped 1.1% from year-ago levels, to $15 billion.

Even with declining orders in the second half of 1990, however, a strong first half helped produce a moderate 3.3% gain last year. Despite declining orders in the fourth quarter of 1990, Cahners Economics predicts that new orders will grow slightly in the first half of this year as end-market demand from the computer industry slowly rebounds from a year-end slump. If the computer industry recovery does not materialize as expected, however—which is largely dependent on business confidence and the unpredictable course of the Persian Gulf war—the component industry downturn may continue.

Electronic component shipments exhibited slightly stronger-than-expected gains in the fourth quarter of 1990, growing 2.4% during the period compared with a year earlier. Shipments growth finished the year with an annual gain on par with new orders. Electronic component shipments rose 3.5% to $60 billion last year.

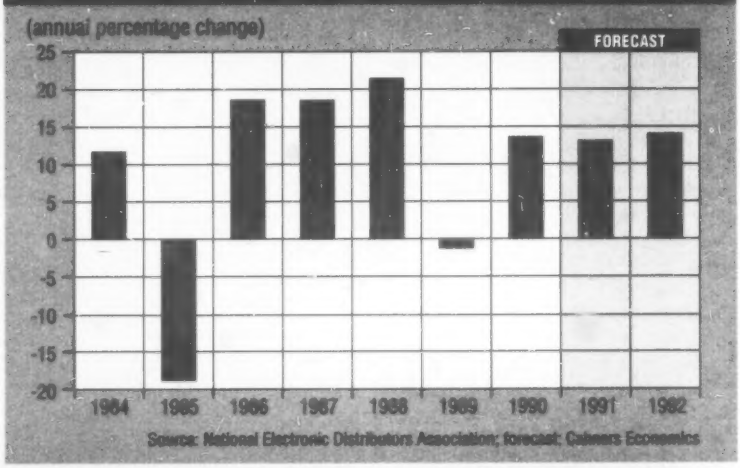
Over the past year, manufacturers have prepared for a slowdown by reducing inventory levels; that has helped the electronic components industry escape a more serious downturn this year. Compared with 1988, when inventories rose at double-digit rates, component makers grew their inventories just 0.3% in 1990.

It now appears that demand for components is on the rise, at least according to buyers. According to *Electronics Purchasing* magazine, delivery times for electronic components are stretching. Lead times stretched to 7.4 weeks this past February, up one week from a year earlier. Buyers' lead times generally rise first, before a turnaround in manufacturers' shipments.

Granted, this is scant evidence of a rebound. But if the war does not extend past July (as expected by two-thirds of the Bob Eggert's Blue Chip Panel of forecasters), the outlook for components isn't as gloomy as current news headlines imply.

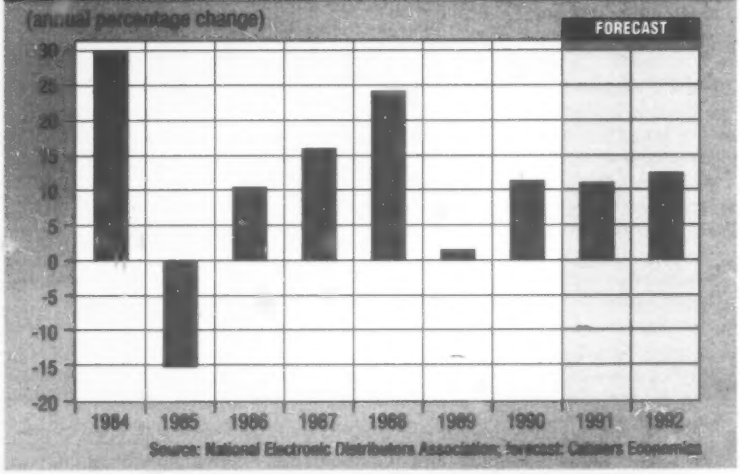
JULIE ANDELMAN

Electronic distributors' new orders



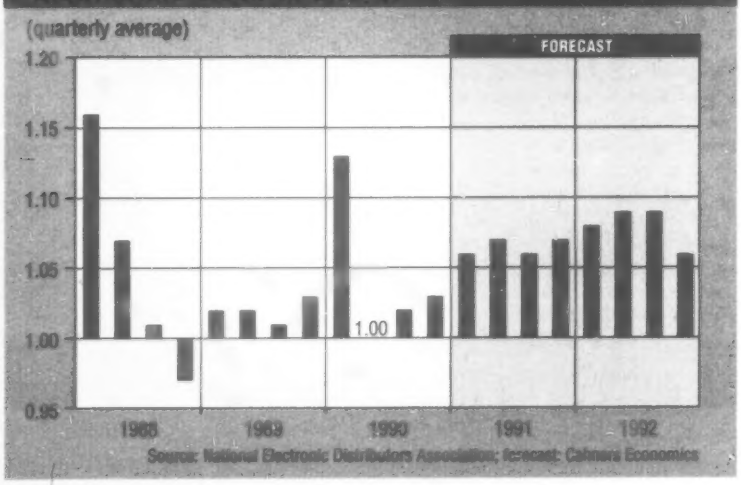
Source: National Electronic Distributors Association; forecast: Cahners Economics

Electronic distributors' shipments



Source: National Electronic Distributors Association; forecast: Cahners Economics

Distributors' book-to-bill ratio



Source: National Electronic Distributors Association; forecast: Cahners Economics

Distributors to see solid growth this year

Electronics distributors reported that new orders grew 9.6% above a year ago in the final three months of 1990. Although this quarterly gain is the weakest recorded since the third quarter of 1989, orders for all of 1990 made a healthy gain. According to the National Electronic Distributors Association, new orders swelled 13.7% above the 1989 level, on the heels of a 1.3% decline in 1989.

Does this mild softening in orders mean the distribution industry will begin to see sharp declines? The book-to-bill ratios suggest not. That ratio stood at 1.04 in December 1990, compared with 0.98 in December 1989. This is the sixth consecutive month the book-to-bill ratio has stood above 1.0, which means orders have been stronger than shipments. A ratio of 1.04 implies that for every $100 worth of products shipped, distributors received $104 worth of new orders. Cahners Economics expects the distribution book-to-bill ratio to stay above 1.0 in every quarter this year, averaging 1.06 for all of 1991.

Electronics distributor shipments inched up 3.1% from November to December 1990. During the final quarter of last year, distributor shipments rose 10.2% above the fourth quarter 1989 levels. Shipments for the entire year were slightly stronger than we had forecast, ending 1990 with an annual gain of 11.4%. Expect distributor shipments to continue rising this year, albeit at a slower pace.

Inventory control continues to act as a critical positive force for distributors. Because distributors have successfully held down inventory levels, they have been able to cushion themselves against the vagaries of war and economic uncertainty. With economic conditions looking brighter later this year due to lower interest rates and stronger business investment (assuming the Persian Gulf war has ended), distributors can expect both new orders and shipments to see strong gains by the end of 1991. New orders are forecast to rise 13.2% this year and 14.1% in 1992, while distributor shipments will swell 11.1% and 12.5%, respectively.

JULIE HANDELMAN

For more information on Cahners Economics' forecasting services, including seminars, newsletters, and database diskettes, contact Dan Buchan at (617) 630-2105, by fax at (617) 630-2100, or write Cahners Economics at 275 Washington St., Newton, MA 02158